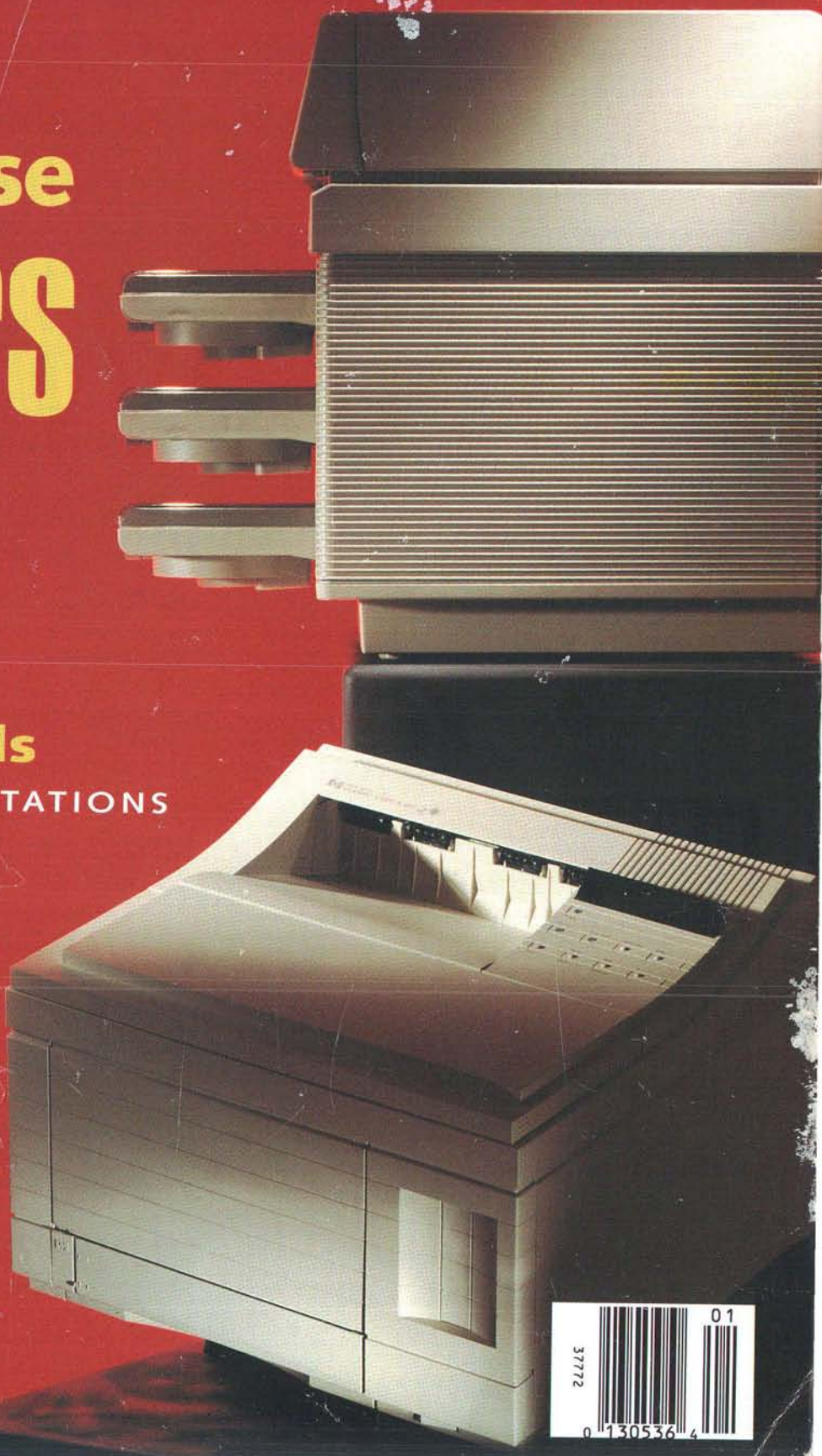
Making Colors Match • 20 CAD Packages Reviewed

MACWORLD

HE MACINTOSH® MAGAZINE

January 1993 $3.95 Canada $4.95



EW GENERATION!

Powerhouse Printers

MW LAB 24 Tested and Compared

Color LCD Panels

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Remote Access Computing

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Capture Video on Your Mac

0 BOARDS COMPARED

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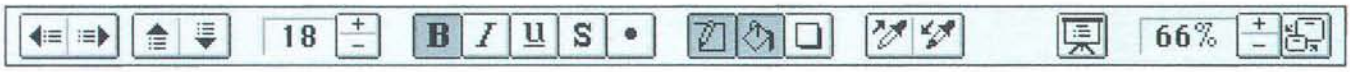
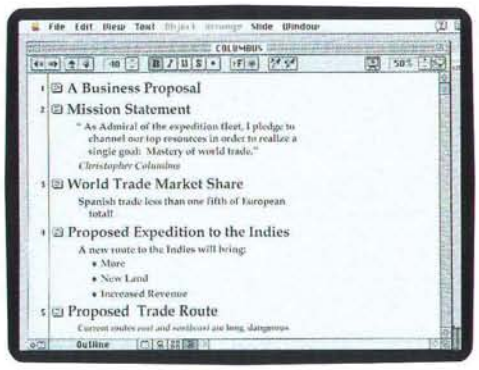
New PowerPoint 3.0 tools make power

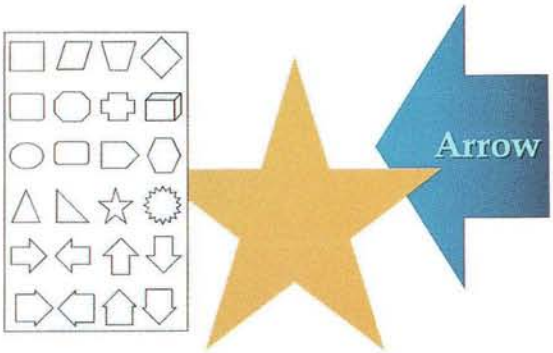


The toolbar. A powerful way to save time. Because now the most commonly used features are just a point and a click away.

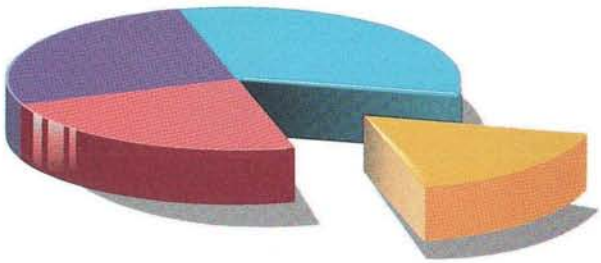
Output you have to see to believe. Creating sharp-looking overheads, 35mm slides or speaker's notes has never been easier.



WYSIWYG Outline view lets you create and work with the content of your entire presentation as an outline. Plus, full text formatting capabilities let you see and edit fonts, sizes and styles right in Outline view.



Presenting the Shape tool. Now making diagrams is quick and easy. There's a palette of 24 adjustable shapes to choose from.



Get graphical. 84 different graph styles to pick from, including 3-D graphs with rotation and perspective control.

Now you have everything you need to make all your presentations as powerful as your ideas.

And that includes cross-platform support. Which means you can share files with PowerPoint 3.0 for Windows™ directly. No translation necessary.

But don't wait too long. Users of the PowerPoint program can only take advantage of this special $99

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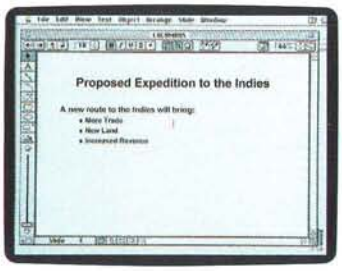
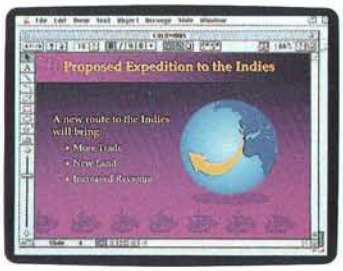
Because powerful ful presentations.





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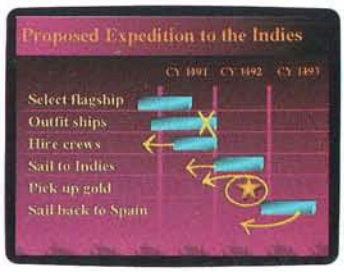

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For your copy of the Microsoft® PowerPoint® presentation graphics program version 3.0 upgrade, visit your nearest reseller or pick up the phone and push these buttons: (800) 426-9400.

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The PowerPoint presentation graphics program fully supports QuickTime™ and System 7,™ and is part of a complete line of powerful Microsoft applications for the Macintosh.®

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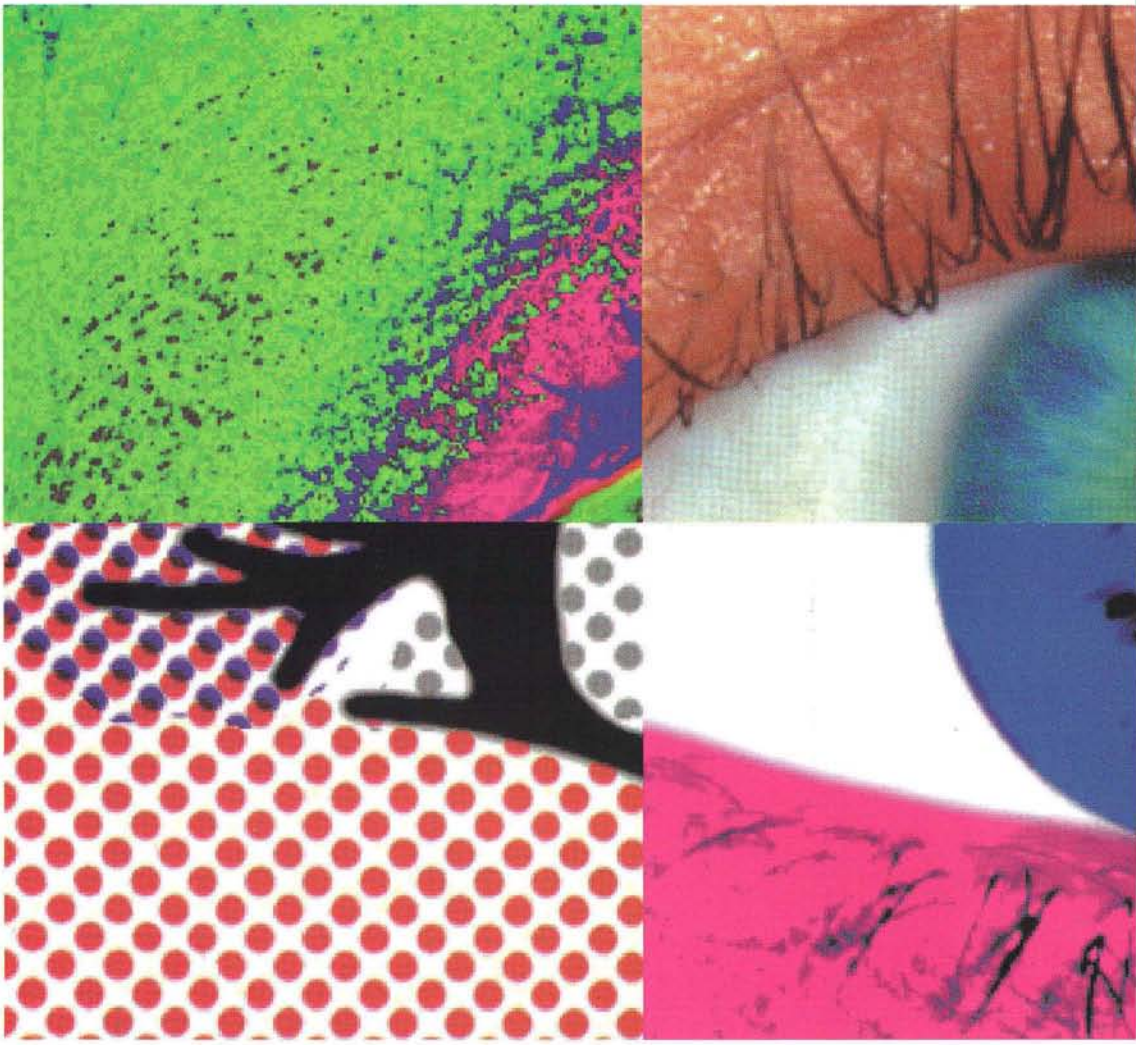

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Presenting NEC's 15″, 17″ and 21″ MultiSync® FG™ display systems*—a colorful combination of our award-winning monitor technology and a display interface card designed specially for NEC FG monitors by Radius.™

Multiple viewing modes give you more flexibility than you've ever had before and allow you to use all your applications more effectively.

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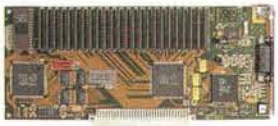

MacUser Aug 1992
MultiSync 4FG

MacWorld MW Editors' Choice
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MultiSync 6FG

C&C
Computers and Communications

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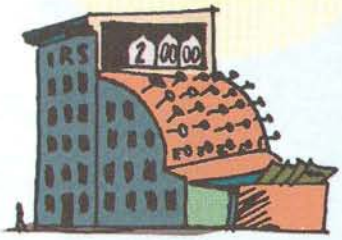
THE LATEST GENERATION OF OFFICE PRINTERS DELIVERS FAST PERFORMANCE AND HIGH QUALITY—AT VERY AFFORDABLE PRICES. OUR COMPARATIVE REVIEW BEGINS ON PAGE 132. (PHOTO BY STAN MUSILEK.)



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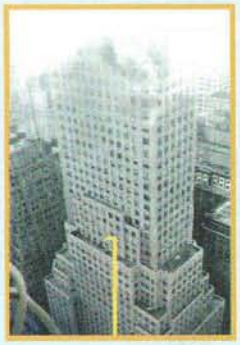

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INTERNATIONAL DATA GROUP

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Christopher Stetson
PC Week

TYPE: 3.5" OPTICAL
CAPACITY: 128 MB
SIZE: 6.9" (H) x 2.7" (W) x 8.3" (D)
WEIGHT: 4.11 LBS
MOUNTING: VERTICAL OR HORIZONTAL

Are you burning through megabytes of magnetic storage? **B**uying hard drive after hard drive? **A**re 88 MB removable disks too slow and limited in capacity? **I**t's time for an optical hard drive!

Introducing the first line of optical hard drives that are lightning fast and have unlimited capacity. **T**he PMO-130™ and PMO-650™ are the fastest optical drives in the industry.

MW LAB Optical Performance Tests

Color Key
Fastest
Percent slower than fastest
Up to10%
11%–20%
21%–29%
30% or more

The drives are listed from best overall performance (top) to worst. To determine rankings, we indexed overall performance numbers against the fastest drive. Index numbers are to the left of product names.
We measured each drive's ability to duplicate a 3.2MB 4th Dimension file, write a 3.2MB file to the optical disk, read a 3.2MB file on the optical disk, open and save a 3.9MB Photoshop file, open and save a 2.6MB PageMaker file, and conduct a 23.4MB Retrospect

Overall Fastest	Duplicate (in seconds)	Write (in seconds)	Read (in seconds)	Open Photoshop (in seconds)	Save Photoshop (in seconds)	Open PageMaker (in seconds)	Save PageMaker (in seconds)	Retrospect Backup (in seconds)	Index (off 100)
1.00 Pinnacle Micro PMO-650 (PI)	31.09	18.29	17.88	27.77	31.75	46.66	82.8	461.0	42.2
0.86 PLI Infinity Max Optical (M)	44.22	26.60	19.11	32.25	26.54	48.61	106.8	448.5	42.1
0.79 MacDirect NuDesign Optical (MO)	47.19	33.98	18.91	36.64	35.91	50.97	142.3	570.3	43.1
0.79 Liberty Systems 115MO (MO)	48.11	33.40	15.74	37.99	36.51	52.25	128.8	568.3	40.8
0.79 DCR Technologies 128REM (MO)	47.58	37.68	16.52	36.77	36.33	51.13	145.6	570.4	38.0
0.79 Ocean Microsystems Vista 128 (MO)	48.59	34.57	19.63	36.62	36.15	51.06	145.6	571.8	45.2
0.79 MacProducts Magic 128 REM/MO (MO)	48.13	34.15	15.40	36.86	36.34	51.82	146.5	577.8	36.1
0.77 Generation Systems 128MB Optical (MO)	48.17	33.85	18.11	36.99	35.99	51.81	147.3	565.9	40.7
0.77 Mirror Technologies 128MB Optical (MO)	48.25	33.74	18.45	37.35	36.68	52.16	147.5	568.4	42.4
0.76 Relax Erasable Optical Vista Hyperspace (R)	49.95	31.89	21.86	38.16	31.13	62.93	147.0	511.0	50.6
0.75 Storage Dimensions MCO1-1000 (M)	56.45	37.05	19.44	36.60	35.94	50.38	140.5	617.7	50.2
0.72 Pinnacle Micro REO-1305 (S)	54.27	33.23	25.14	40.82	36.18	62.60	158.3	546.2	50.8
0.72 Sony RMO-S250 (S)	54.18	33.11	24.81	41.64	36.33	63.20	160.6	569.1	47.5
0.71 PLI Infinity Optical 3.5" (S)	53.61	31.00	24.78	42.91	38.72	63.31	160.7	551.3	43.4
0.71 Optima Technology DisKovery 128 (S)	54.60	33.11	25.31	42.16	36.47	64.13	160.9	565.3	49.1
0.70 Relax 128MB Optical Siena (R)	54.02	37.66	20.58	42.30	40.17	54.62	171.9	680.2	39.7
0.70 Tulin Technology A-Hive Jr. MO-120 (R)	54.24	37.18	20.24	42.54	40.72	54.60	175.3	680.2	45.7
0.70 Mass Microsystems DataPak MO/128 (MA)	54.72	37.18	20.09	42.60	40.92	54.79	178.6	675.8	38.6
0.70 La Cie 128MB Cirrus Optical (MA)	54.11	37.37	20.24	42.60	41.43	55.30	173.4	675.9	42.4
0.70 TASS Optical World PL128 (MA)	54.18	37.59	20.45	42.83	40.05	58.96	178.5	675.1	42.0
0.70 Rodime Systems Condor 650e (R)	57.71	39.18	21.66	40.91	37.64	63.54	205.1	640.3	42.6
0.70 Rodime Systems Condor 130e (R)	54.82	37.88	20.62	43.07	41.15	59.46	175.6	698.4	40.7
0.69 Procom Technology MEOD128 (M)	54.54	34.68	24.75	42.97	37.08	58.74	212.6	571.1	48.7
0.69 MicroNet Technology SB-TMO-1000 (M)	61.96	39.30	20.26	38.59	35.24	67.28	185.1	654.9	40.7
0.68 Optical Access Access RD/Aria (MA)	58.17	38.81	20.79	45.80	43.82	59.41	176.2	709.6	40.3
0.67 [illegible] Bound [illegible]65[illegible]HS (R)	[illegible]	[illegible]	[illegible]	44.21	35.16	[illegible]	[illegible]	[illegible]	41.[illegible]

Macworld Magazine, Nov. 1992 "Optical Update". Forty-three drives tested. 5.25" mechanism standings:
1) Pinnacle Micro PMO-650, 2) Maxoptix Tahiti II, 10) Ricoh Hyperspace, 28) Sony E-501, 41) Hewlett-Packard Corsair.

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Charles Piller
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"The PMO-650 is the first rewritable optical drive we've ever tested that can get out and run neck and neck with hard disks"

Rex Farrance
PC World

TYPE: 5.25" OPTICAL
CAPACITY: 650/600 MB
SIZE: 7.3" (H) x 3.6" (W) x 10.0" (D)
WEIGHT: 7.4 LBS
MOUNTING: VERTICAL OR HORIZONTAL

Optical technology has many advantages - removability, reliability, infinite storage capacity, and a lower cost per megabyte than magnetic media.

COST PER MEGABYTE COMPARISON

Drive Type	Retail/650 MB	1.3 GB	2.5 GB	5.0 GB
PMO-650 Optical Drive (1 Disk)	$4,194	$4,393	$4,770	$5,545
Magnetic Hard Drive (650 MB)	$3,745	$7,490	$14,400	$28,800
88 MB Removable Magnetic Disk	$2,394	$3,790	$6,367	$11,734

The PMO™ series are based on Pinnacle's own OHD™ (Optical Hard Drive) technology, making Pinnacle the leader in performance and innovation. There is no higher source in the industry. The PMO-130™ and PMO-650™ *are* the Twin Peaks. Plug-n-play for MAC, PC and compatibles, PS/2, SUN, HP, DEC, and Silicon Graphics. It's more than a hard drive - It's optical!

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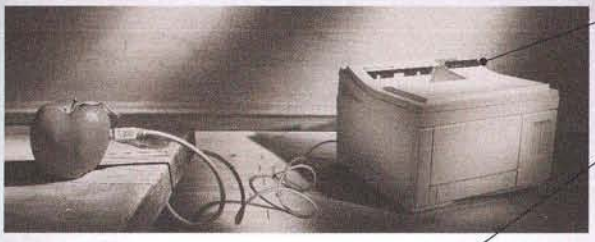
Looks like Mac users just got

The new generation HP LaserJet 4M printer.



True 600 dpi creates rich, full-dimensional text and graphics.

Smoother curves, no jagged edges, thanks to HP's exclusive Resolution Enhancement technology.

Microfine toner makes 600 dpi output look even sharper.

35 PostScript Type 1 typefaces for Mac and PC PostScript users, and 35 Intellifont and 10 TrueType typefaces for PC users produce a broad range of document styles.

LaserJet

4M

4M 4M 4M 4M 4M

The HP LaserJet 4M is the one for all. Macintosh and PCs alike. This new generation provides superior output with 600 dpi, Resolution Enhancement technology and microfine toner. 6MB built-in memory means that PostScript files and full-page graphics print out crisp, clear and fast.

At last. Hewlett-Packard introduces a laser printer built specifically for the Mac from the ground up—the new LaserJet 4M. A laser printer for Mac users with everything you expect. And, more importantly, everything you need. From built-in PostScript Level 2 software from Adobe and 6 MB of memory, to standard LocalTalk and optional EtherTalk. Features which make certain this new generation in laser printing is ready-made just for you.

Faster printing of complex documents.

The finest print quality in its class. In addition to complete Macintosh compatibility, the LaserJet 4M printer also delivers the finest print quality of any 600 dpi machine available—thanks to

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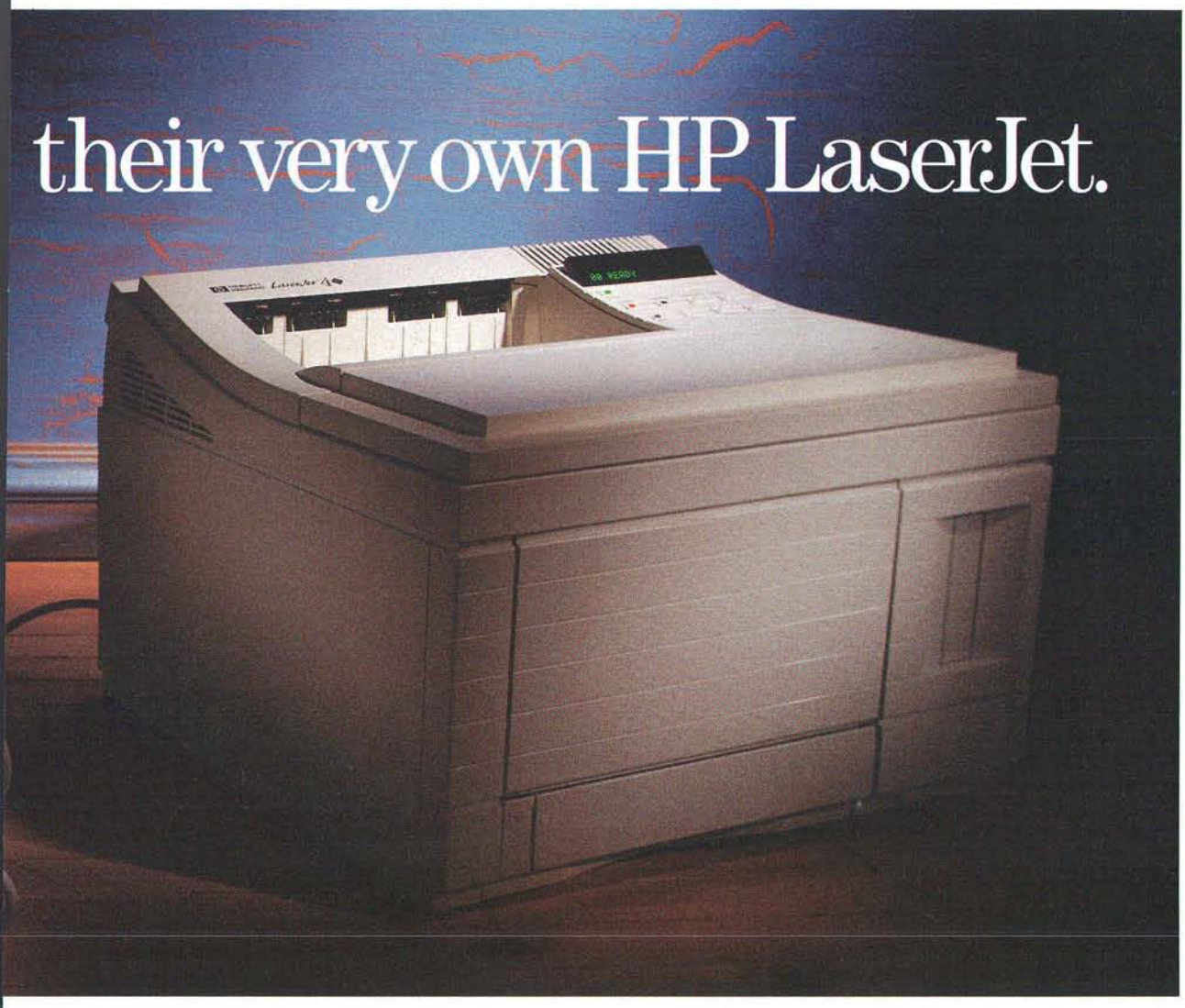
their very own HP LaserJet.



HP's microfine toner, Resolution Enhancement technology, and an advanced engine expressly engineered for 600 x 600 dpi.

New generation features mean you will lose no time getting your work onto the page. A new RISC processor and 6 MB of standard memory accelerate formatting and I/O speeds, so complex PostScript language and graphics files are rendered faster and more clearly than ever before.

6 MB of memory built in.

Greater flexibility.
But this wouldn't be an HP-caliber breakthrough if the innovations weren't across the board. That's why, even though the new generation LaserJet 4M printer is built for the Macintosh, it will perform for DOS and Windows users as well... automatically. Automatic language switching (between PCL 5 and PostScript) and three hot I/O ports (serial, parallel, and LocalTalk) make sure users are able to share the printer simultaneously. Without waiting.

Also, because of the LaserJet 4M printer's two integrated paper trays (total capacity 350 sheets) and optional 500-sheet tray and power envelope feeder, you will save time, avoid paper-handling hassles, and gain flexibility.

HP quality and reliability.
The new generation LaserJet 4M printer lets you enjoy the one particular no other Macintosh laser printer can offer—the renowned quality and reliability which comes with owning an HP peripheral. Not to mention our outstanding customer support, where information about how to get the most from your printer is never more than a phone call away.

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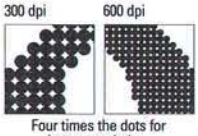

Four times the dots for better resolution.

Surprisingly affordable.
Perhaps the most remarkable attribute of the new LaserJet 4M printer is the price—$2,999.*
A breakthrough in its own right. So call **1-800-LASERJET (1-800-527-3753), Ext. 7135** to receive a print sample** and comparison disk to see the quality for yourself.† Or visit your nearest authorized HP dealer and see the printer built to add some polish to your Apple.

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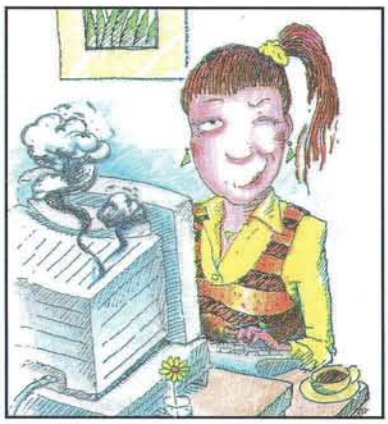
**To have a LaserJet 4M printer data sheet sent immediately via fax machine, call 1-800-964-1667 from your touch-tone phone. †In Canada call 1-800-387-3867, Ext. 7135. Adobe and PostScript are trademarks of Adobe Systems Incorporated which may be registered in certain jurisdictions.



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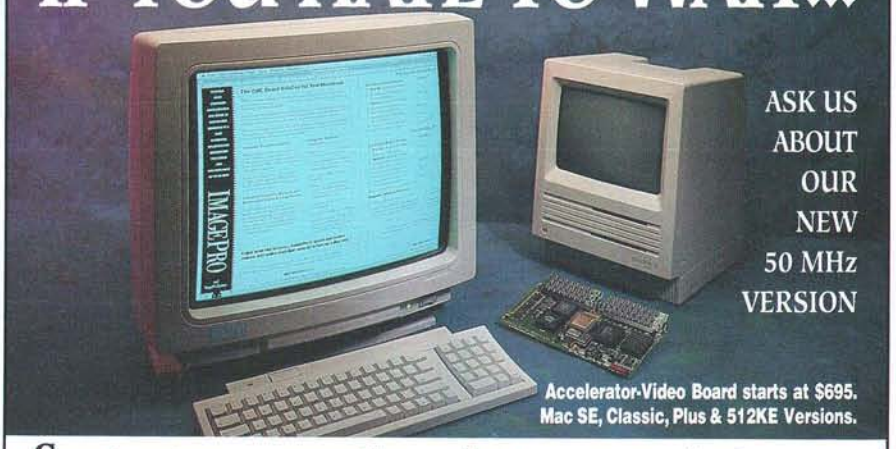

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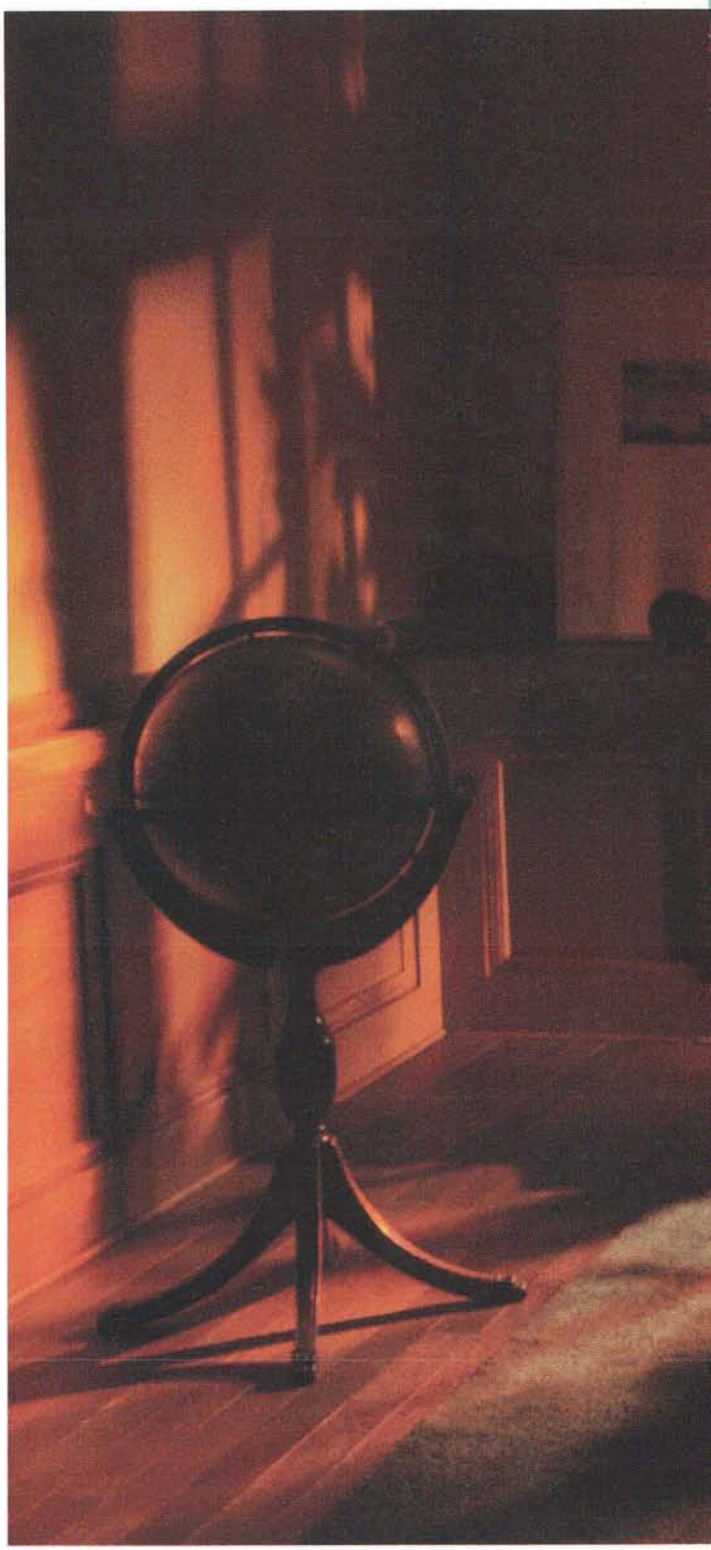

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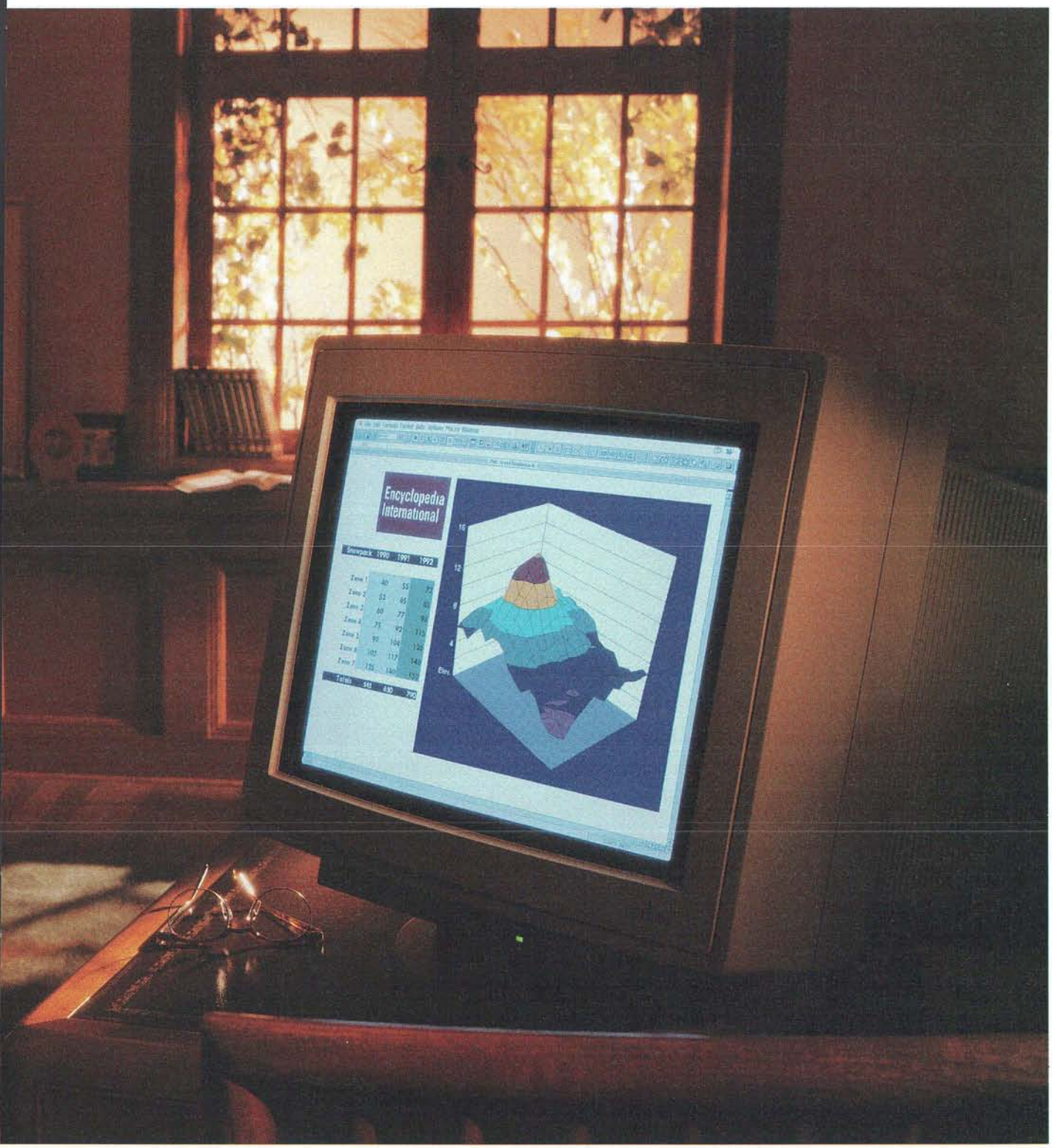

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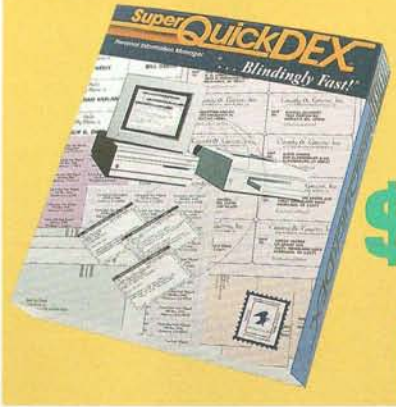

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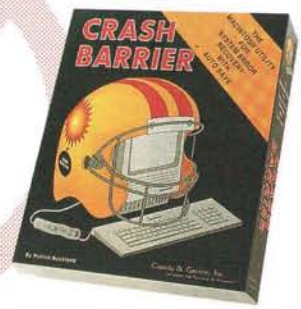

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The Evolution of CAD

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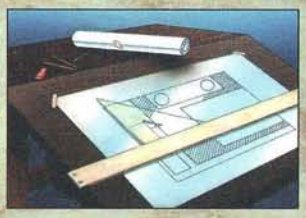
In the beginning of time people had to use primitive design tools for creating any type of graphics.

In the 15th Century design tools were quill ink pens and crude styles of paper.

By the 18th Century we had advanced to the drafting table with T-squares, and the dreaded eraser.



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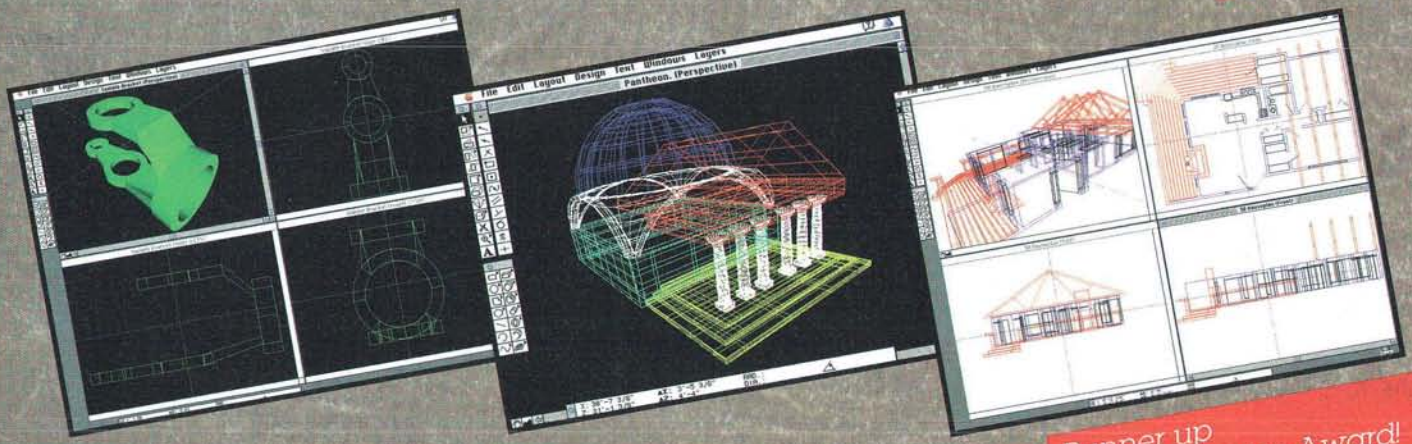

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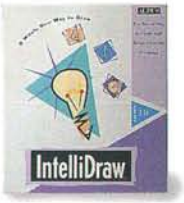
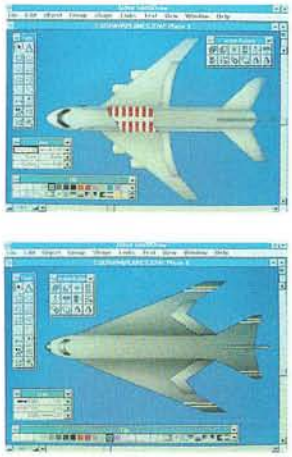


We know what you're thinking: "revolutionary new drawing program... rrrright, I've heard that before." But consider, if you will, a couple of the aforementioned 43 new features: the Symmetrigon™ and the Connectigon.™ They're perfect examples of how IntelliDraw makes drawing faster, easier, and more importantly—exciting.



With the Symmetrigon, you simply draw one side of an object and the other side (or sides) are drawn automatically. On other programs, you'd have to draw each side one step at a time.

As for the Connectigon, it lets you change dimensions and perspective almost instantly (for an example of what we're talking about here, take a look at the plane illustrations, above). And remember that with other drawing packages, modifications such as these would be laborious at best.

We could go on and on. After all, that's only two of the 43. But suffice it to say:

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MacBulletin

LATE-BREAKING NEWS

Apple's Record-Breaking Earnings: Apple Computer had its highest-ever revenues and net income for the fourth quarter and for the company's fiscal year 1992, which ended September 25. Revenue for the quarter was $1.768 billion, up 17 percent from the same quarter a year ago. Net income for the quarter was $97.6 million, up 20 percent. For fiscal 1992, net revenue rose to $7.087 billion, up 12 percent over the previous fiscal year.

And Mac Shipments Rose: Apple also reported that unit sales of Macs were up 35 percent for the fourth quarter versus the same quarter last year, and up 20 percent for the 1992 fiscal year. Apple now surpasses IBM as the leading vendor of personal computers, in units shipped. PowerBooks accounted for more than 400,000 units in their first year of existence.

Lotus Upgrades 1-2-3: Lotus 1-2-3 version 1.1 catches up to a few features in arch-rival Excel with drag-and-drop moving of cell ranges, automatic summing of rows and columns, and filling down or across (or, in 3-D sheets, back). Version 1.1 also has improvements in graphing, drawing, and presentation features. It lists for $495 from Lotus, 617/577-8500.

Symantec Upgrades SAM: Symantec (408/253-9600) is upgrading its anti-virus utility to version 3.5 in two flavors: a single-user version and a network version with a network installer. Both have a much-simplified interface; can be set to run virus scans at a certain time; and can scan files compressed with StuffIt and Compactor. The single-user version lists for $99; ten-packs for $759.

PhotoPro Speeds Photoshop: RasterOps (408/562-4200) has begun shipping PhotoPro, a RISC-based accelerator that helps a Mac II run Photoshop from four to ten times faster than a IIcx can, the company said. The $999 NuBus board accepts multiple PhotoPro piggyback accelerator boards that work in parallel to further increase performance. Those boards also list for $999 each.

PowerBook Printing: Palomar Software (619/721-7000) has developed On the Road, a $99 print-delay utility that allows PowerBook users to issue the print command in normal fashion when not connected to a printer; the utility automatically prints all documents when the network connection is reestablished. On the Road supports many printers and fax modems and works with LocalTalk, EtherTalk, and AppleTalk Remote Access.

RAM Prices Jump: In the wake of a U.S. Department of Commerce preliminary finding that several Korean RAM vendors have been selling their chips for less than they cost to produce, DRAM prices rose by about 50 percent, apparently in anticipation of possible tariffs.

More Mail Gateways: StarNine Technologies (510/649-4949) has announced Mail Link for cc:Mail/QM, an MHS-compatible link between QuickMail and cc:Mail that does not require a Novell system or other MHS (message handling service) host. StarNine is also shipping version 2.0 of its MHS gateways for QuickMail and Microsoft Mail, with improvements to file-enclosure support and address management. Pricing depends on number of users. m

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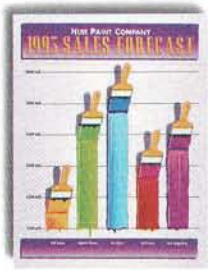

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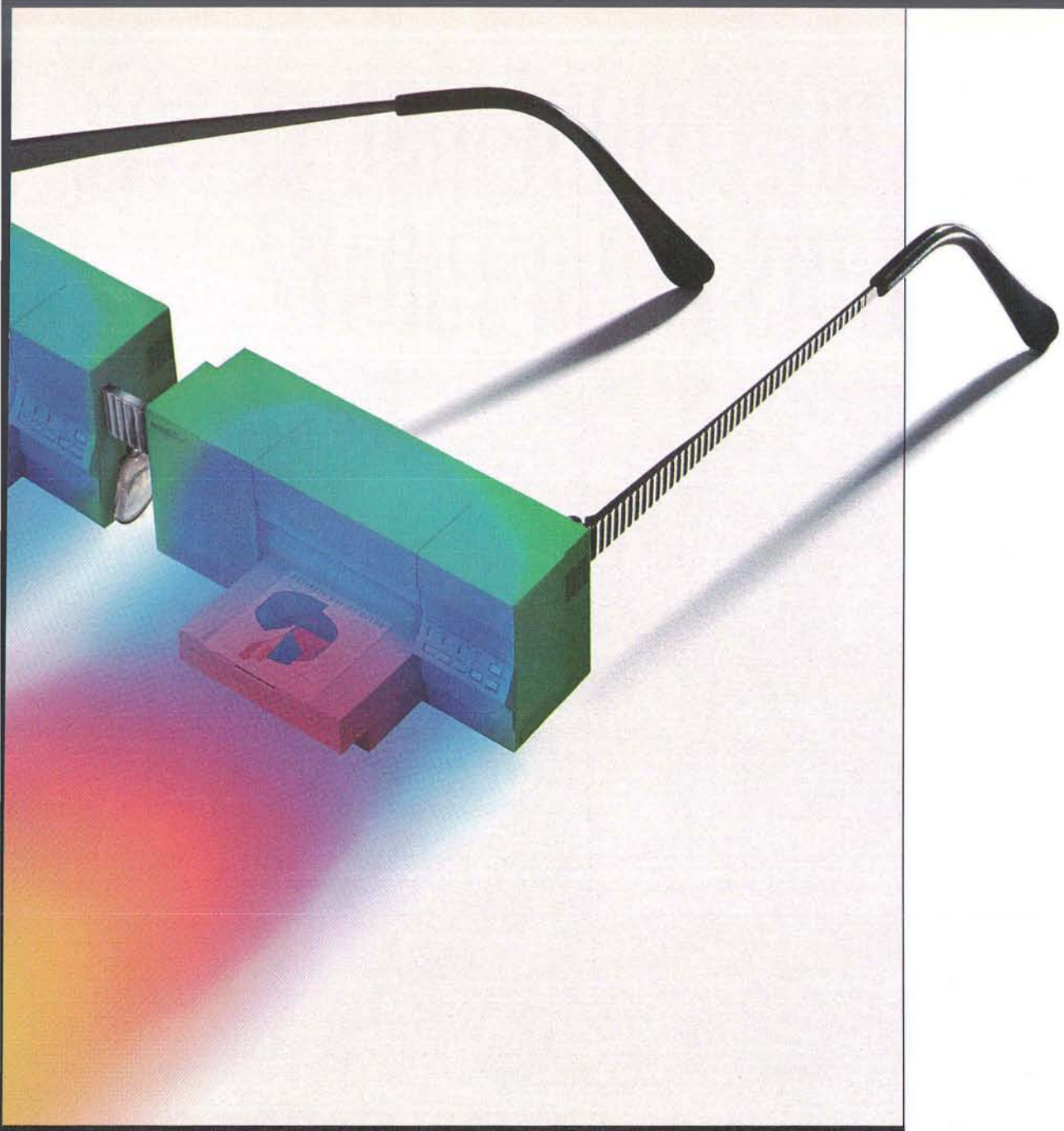

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TECHWORKS

The Changing Mac Landscape

BY ADRIAN MELLO

AS THE PRICE WAR IN PERsonal computers continues raging, the Macintosh landscape is undergoing radical change, affecting which models will continue to be available and which users will be best served. Over the last two years Macintosh prices have fallen dramatically. A couple of examples illustrate just how aggressive with pricing Apple has become. Two years ago the Macintosh Classic was introduced at a suggested retail price of $1499 for a configuration with 2MB of RAM and a 40MB hard drive. Today you can buy the more powerful Classic II with an additional 2MB of RAM for $1079 (with street prices often under $1000). And Apple now offers the LC II for $1239, less than half the original $2499 list price of the LC.

What's causing the price avalanche? PC prices in the DOS and Windows market have fallen through the floor because of intense competition among clone vendors. To remain competitive, Mac prices have followed suit. It's now clear that Apple made the right decision two years ago when it boldly introduced three new low-cost models—the Classic, the LC, and the IIsi. These products reversed a long-standing trend of introducing continually-higher-performance models offered at premium prices (a good idea at first, but an increasingly dubious strategy as prices plummeted for DOS and Windows-based computers). Those plummeting prices forced Apple to bring out the low-cost Mac and change the fundamental nature of the company so that it could sell a high-volume product line at significantly lower profit margins. The company cut costs in a number of ways, including laying off workers, reorganizing manufacturing and distribution, and putting existing functions into fewer chips. Now, having surpassed IBM to become the single leading vendor of personal computers, Apple appears well prepared to meet the challenges of falling prices.

How Prices Change Products

BUT PRICE WARS MEAN MORE THAN just a pleasant surprise for buyers. Radically falling prices also set off a cascade of events that will permanently alter the Macintosh price/performance landscape. Here's how it looks to shape up.

First, price changes in one part of the range almost always affect prices elsewhere in the range. As midrange models drop in price, low-end models also drop. Last autumn Apple cut the IIsi from $2499 to $1729, which would have been only $30 more than the LC II. To prevent the less capable LC II's sales from dying out, Apple also reduced that machine from $1699 to $1239. For the time being, there is a $500 difference in list price between the two models.

And, as more features are squeezed into new models at the old prices, the old models are often squeezed out of existence. The introduction of progressively more nimble Macintoshes led to the extinction of the Mac II, IIx, IIcx, and IIfx. And now twilight has fallen upon the IIsi and IIci, eclipsed by the newly introduced Mac IIvx and the Performa 600.

Finally, as low-end machines become more powerful and midrange machines become less expensive, most buyers will choose systems between $1000 and $2000, because those systems offer them enough performance at a good price. This means it's time to rethink the geography of Macintosh models. Instead of a clearly stratified low end and midrange, there is a high-volume market emerging that will constitute the bulk of computer sales. Call it the mainstream, if you like; it is likely to be in that price range between $1000 and $2000. The narrower price band is likely to eliminate important distinctions between the buying power of users. More people will have access to the Mac experience at a higher level of performance—running color QuickTime, for example.

New High-Volume Market

PERSONAL COMPUTERS IN general are already undergoing a market implosion. In 1991, most of the personal computer market growth was for systems priced from $1000 to $2000, according to International Data Corporation, a research concern owned by *Macworld*'s parent company. This segment represented 39 percent of the growth and 43 percent of the revenues. Systems priced from $2000 to $3000 grew only 6 percent. Sales of systems under $1000 fell by at least 20 percent, and sales of systems $3000 to $7000 fell by a whopping 30 percent.

Although the Mac's superior hardware and software integration and refinement will still command a premium throughout the product range, the continuing question is how much of a premium are potential new users willing to pay. Prices of high-volume Mac models must remain in the ballpark to compete with Windows-based computers.

Mac prices are already very good. It's remarkable that you can get a complete Performa 600 system with a hard drive and color monitor for a street price of around $2400. The Performa 600 is a reasonably powerful midrange computer, capable of more than enough performance for most applications. Unlike the LC II, the Performa 600 is a suitable choice for most businesses. And don't be surprised if home and education users find it hard to resist the added performance of a Performa 600, especially one equipped with an internal CD ROM drive.

However, although prices have improved, a $2400 system like the Performa 600 is still too pricey for many would-be computer buyers who have never used a Mac. At present it's easy to find a fully configured 80486 machine running the latest Windows for $1500 to $1700.

To gain market share in desktop personal computers, Apple must offer a full system similar in capability to the Performa 600 or Mac IIvx for under $2000. Naturally, current Mac users are unlikely to convert to Windows.

Apple is now the leading PC vendor

Wish List for Low-Cost Macs

SO, IF FULLY CAPABLE MAC business systems become available for under $2000, what will be the consequences for low-cost Macs such as the Classic II and LC? At this point, both of these machines need to compete for new users with 286- and 386-class machines that now cost under

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$1000. That price includes a complete system with a color monitor and hard drive. An LC II with a color monitor and keyboard currently sells for around $1700 or less—still quite a bit more than a supposedly comparable Windows machine. To win more new users, Apple should continue to cut prices and should boost the performance of the Classic and LC models or their eventual replacements.

Here are some suggested performance targets for entry-level Macs. Think of it as a wish list, not as a prediction. The next Classic design should provide at least as much performance as the now-discontinued SE/30. Many long-term fans of the traditional Mac design were disappointed with the Classic II's slow performance relative to the SE/30. And for interest's sake, it's also time to add something extra to the Classic design, such as an optional CD ROM drive, a color screen, or at the very least an expansion slot. Of course, all these features add cost to a machine that should be kept under $1000.

The next LC should offer performance comparable to the soon-to-be defunct Mac IIsi. The LC will need a little more power to handle growing expectations of home use and light business use. It needn't be as fast as the IIvx or include more than one slot. Providing a CD ROM option similar to that of the Performa 600 and Mac IIvx would be great. To remain competitive, the more-powerful LC system with monitor and keyboard should sell for a street price under $1500.

Both the LC II and Classic II suffer from narrow data buses. In fact, the two machines share a similar board design. Although it's true that both use a 32-bit microprocessor, the LC II and Classic II can only transport data to and from the processor at 16 bits. (This is a little like having a coffee maker that produces 32 cups of coffee in a single brewing, but the pot can only hold 16 cups—you can still only make 16 cups at a time.) Apple could speed up both machines by upgrading the board design with a broader data bus.

For years everyone has anticipated the day when a computer would cost about the same as other electronic appliances such as video and stereo systems. Although we aren't there yet, Macs are quickly approaching this point. In the meantime, the Macintosh world has changed permanently. Within the coming year most midrange and low-end Mac sales will converge within a new high-volume market. High-volume Macintosh desktop models will probably be separated by a span of about $1000 to $1500. And they'll increasingly provide a higher-quality Mac experience to many who could not have afforded it before. m

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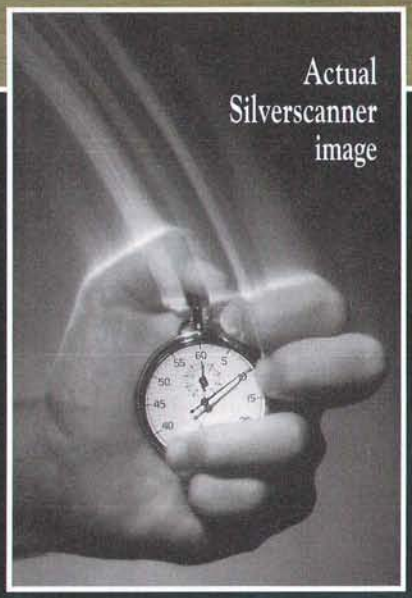

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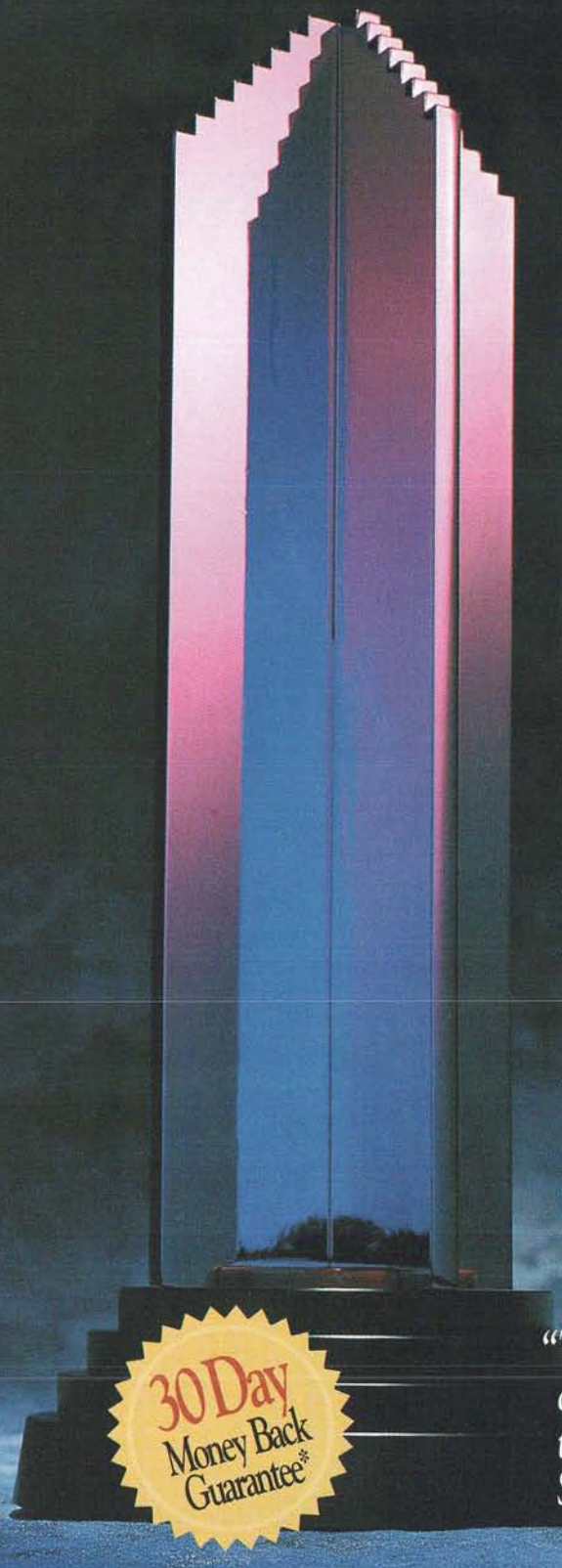

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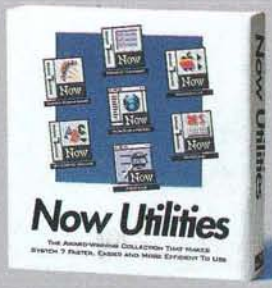

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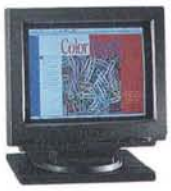

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Letters

JANUARY 1993

Digital Edition

DAMN GOOD EDITORIAL, THAT one you wrote about electronic magazines and books being convenient, yet at the expense of libraries and bookstores (*Commentary*, October 1992). Convenience, speed, efficiency: all the effects of electronic, that is, digital, media, would be great; but I'm kicked back in my armchair right now, Tolkien's *The Hobbit* in hand, coffee at my side, and a *Field & Stream* at my feet, and I have to say that my self-imposed absence from my Macintosh is not only nostalgic but also downright relaxing.

Electronic media are a godsend for the workplace, and even in my own struggles with The Novel I feel dependent on electronic research. But it's times like right now, work done and the toes pointing skyward, that I have to say plain old paper and ink does the trick.

Mark Siely
Java, South Dakota

THE FULL-SERVICE BOOKSTORES whose disappearance you bemoan are in trouble not because of reading habits—readership and book sales are up—but because of competition from the chains who sell limited lines of popular best-sellers at discount prices. Of interest would have been your reflections on parallels involving clones in the computer business.

In your conclusion, you say that there will be "No more misfiling." As so often, you emphasize the technological possibilities but forget the human work that lies behind them. Remember how, at the Library of Congress, all the books got in places where you might want to find them? Catalogers did it all—expensive people working with complex procedures to make your life as a reader more simple. Intellectual organization won't happen automatically in the electronic age, either.

Peter S. Graham
Piscataway, New Jersey

BORRELL RAISED A FASCINATING issue of equity. He says that the same people who can't watch cable will probably not be able to access electronic communications. The federal government must establish a policy of equal access to information, or the poor will not be able to afford electronic communications. Otherwise, the feds will simply encourage the existing class structure of educated elites and displaced industrial workers.

Kris Magnusson
Salt Lake City, Utah

Trust Ehman or Not?

AS OF RIGHT NOW, I AM OUT $500 plus a lot of time in tracking down a lost monitor, not to mention long-distance phone calls, photocopying, and fax expenses. You were much too kind to Michael Ehman in your article (*Conspicuous Consumer*, October 1992). As far as I am concerned, he is a con man of the worst sort, and it would appear that he conned you also regarding his concern for former Ehman Inc. customers.

Nevertheless, thank you for being a thorough watchdog in an industry whose high-speed products are often matched only by unscrupulous, fast-lane business practices. I wanted to add my voice to the five complaints against Ehman/Bridgette mentioned in your article.

Paul Cummings
San Jose, California

I FIND I CAN'T BE VERY GENEROUS when it comes to judging Mr. Ehman. Sure, I was told my Cutting Edge drive, still under warranty, was repaired; but unfortunately, when I tried to use it I found it had the same problem it had when I sent it to them.

Apparently, Ehman believes he's sincere about taking care of customers' complaints; but if he really is, he can prove it by satisfying the five—of which I'm one—

continues

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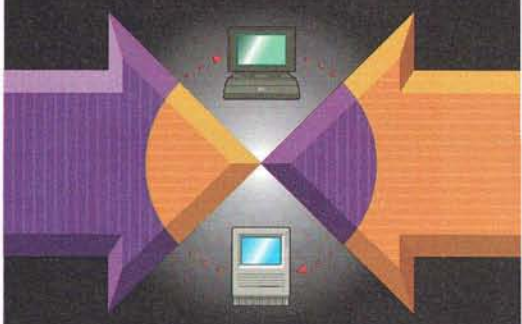

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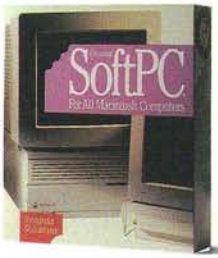

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Circle 72 on reader service card

who wrote to *Macworld* with complaints about his company. He probably will make a comeback, one way or another. But will I ever be reimbursed the $375 I'm out because I've had to get my hard drive repaired locally?

Norma von Stück
Lansing, Michigan

I THINK THE ARTICLE "HOW EHMAN Inc. Unraveled" was pathetic, useless, boring, dull, and unwanted. If you can find five Mac users, excluding the ones working at *Macworld*, that are interested in how Ehman Inc. became Bridgette, then I will ignore the wasted natural resources used to print these articles. I don't read *Macworld* to hear about the companies that go kerplunk, and I don't think anyone else does either.

David Tannenbaum
Great Neck Estates, New York

Ultima Pro and Con

I WOULD LIKE TO POINT OUT A FEW things the reviewer missed in his review of Ultima Home Office (*Reviews*, October 1992). He mentioned that the sound quality in incoming and outgoing messages in the voice-mail system was poor. I noticed the same thing initially, but after reading a few pages in the manual, I discovered that the sound quality is adjustable. When I chose Better or Best in the dialog box, all messages took up a little more disk space but sounded fine.

He also said a bug occurred when he deleted message files, specifically that their names still appeared in the message queue. This is also adjustable, so you can save the message names as a record of calls if you wish. It takes about ten seconds to set it up in order to also delete the names.

Finally, the reviewer called Prometheus technical support "underwhelming." I have only called them twice, but both times they answered my questions in a timely and satisfactory manner.

Dan Aldrige
Frankfort, Michigan

IN HIS REVIEW OF ULTIMA HOME Office, Tom Negrino comments on the buggy software and poor technical support provided by Prometheus. My experiences have been the same.

I have not been able to make the receive-fax function or the voice-mail function work with any consistency. I have found that Prometheus technical support is frequently not available and that Prometheus does not believe in returning phone calls. When I finally did talk to one of the individuals in technical support, he blamed my problems on my INITs, especially Pyro. I removed Pyro, and my problems continued. I then removed my other INITs, and Ultima Home Office still had problems receiving faxes and handling voice mail. I am going to go back to using my answering machine and paper-based fax.

Joel Bowman
Kalamazoo, Michigan

Music from a Master

REGARDING THE MIRACLE PIANO Teaching System (*Reviews*, October 1992), your comments on the lack of dynamics and expression were very good. However, one thing I have found in 14 years of teaching is that students generally have extremely poor rhythmic control, so maybe it is not so bad that a method aimed at beginners tries to develop a good solid rhythmic base. Most of my students can sight-read pitches, but rhythm is a different matter. Students really don't seem to grasp the relationships between note values. Of course, if they never go beyond the basics, they never develop any real musicianship, either. The Miracle System probably needs a follow-up course.

Jay Rogers
Downey, California

CORRECTIONS

The correct number for more information on ImageAccess (New Products, *October 1992) is 800/526-4566.*

We tested the Hewlett-Packard 650M Stand Alone Disk Drive/Sony. We did not test the newer Hewlett-Packard 650C Stand Alone Disk Drive/HP ("Optical Update," November 1992).

The Pantone Color Formula Guide 747XR is not provided with the HP PaintJet XL300 color printer (Reviews, *October 1992).*

Hitachi, Sony, and Panasonic offer support only through the dealer ("CD ROM Drives: Into the Mainstream," October 1992).

The accelerator that Apple Computer tested and qualified as compatible with the Performa 600 was DayStar's Universal PowerCache, a 68030 accelerator ("Mass Market Macs," November 1992).

The Microtech Genesis 120 has a 3½-inch form factor, not 5¼ inches as listed in the table ("Optical Update," November 1992).

ExpertWriter and Expert Color Paint are from Expert Software (Conspicuous Consumer, *November 1992).*

Volk Clip Art EF costs $44.50 per month (New Products, *November 1992).*

Motion Works Promotion 1.0 can record sounds. This was not a consideration in the rating (Reviews, *November 1992).*

The picture for Kodak Renaissance should have been in color (Reviews, *December 1992).*

Parent Companion

KID PIX COMPANION DESERVES AT least four stars instead of three, from my point of view (*Reviews*, October 1992). When my kids come into the room wanting to play with Kid Pix they don't want Dad telling them what to do or draw. With Kid Pix Companion I am now wanted and needed again to help them make a movie file or teach them how to do more with the program. Companion gives them something to look forward to and something for me to do with my kids besides letting them take over my computer.

Michael Lukeroth
Glen Burnie, Maryland

Nontechies on Scanners

MY WIFE AND I BOTH OWN well-established design studios, which are almost exclusively Mac-based. I was dismayed by reading Joe Matazzoni's recent article "Seeing Through Slide Scanners" (October 1992). All too often your articles are written from the point of view of tech heads, not people who are actually out here making a living doing professional work on the Mac. Your writers often miss the point of how useful or useless equipment and software can be, because the writers are not dealing with anything but lab tests and searching for "more elegant" approaches. The scanner article is a perfect example of this—it tells us how scanners work (who cares?); rates the products on a variety of technoid issues, which are largely moot, because none of the scanners are good enough to use for prepress; and it fails to provide information on the many ways that slide scanners are extremely useful to design studios on an everyday basis.

Douglas Ethridge
Seattle, Washington

continues

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Tektronix

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550 people attended the all new MacAcademy Learning Extravaganza in October 1992. After 5 days of attending workshops they gave the program a rating of 4.7 on a 1 to 5 scale! *"It was fantastic." "The greatest most valuable training I've ever attended." "Great instruction!" "The instructors were all very knowledgeable and friendly. I would not hesitate to recommend it or come again!" "By far the best training environment I have ever attended." "I would recommend it to any Mac user." "What a week! Learned more than I ever imagined possible." "The PageMaker class was worth the whole registration fee. It will save me hours in computer time alone!" "The five days were outstanding! The Extravaganza is a tremendous value."*

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ven Steve Wozniak, co-founder of Apple Computer signed up for he Learning Extravaganza. When asked for his opinion he said the xtravaganza was "cool" and that he'd be back next year!

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Mac Add-Ons	3.0 Hours
Using Macintosh Fonts	1.5 Hours

Additional Workshops

Macintosh Accounting	3.0 Hours
Mac Business Ideas	3.0 Hours
Design & Layout Ideas	1.5 Hours

Workshops are 90 minutes in length. The number of workshops for each program varies.

Circle 106 on reader service card

What's Wrong with This Figure?

IN THE ARTICLE ("WHAT'S WRONG with This Picture?" October 1992) you admit to having made an error, explain its cause, and yet commit a similar error again. The real and perceived difference in the bags is not 4 to 1, but exactly 8 to 1—you are not depicting a two-dimensional object, but a three-dimensional one; therefore, doubling the size of each axis results in an eightfold increase in volume. The three-dimensional character is even enhanced by the shadows in the graphic. Thus, your graphic is about 41 percent off the mark, though admittedly, it looks nicer than a bar chart.

Robert Seiler
via CompuServe

The text and caption are talking about area—since the illustrated bag is 2-D—so the 4 to 1 ratio is correct. But although the image is 2-D, the bag is meant to represent a 3-D space, and the difference in volume would indeed be 8 to 1.—Ed.

CHARLES SEITER'S ARTICLE HAS taken almost all of its examples from the book *The Visual Display of Quantitative Information*, by Edward R. Tufte (Graphics Press, 13th printing, 1992, $40) without any credit or acknowledgment. The section talking about distortion from special effects is covered more thoroughly in chapter 2 of Tufte's book. The use of facial expressions graphics is on page 142. The scattered scatterplots showing how two data sets can have the same statistics but show different interpolations when viewed on a scatterplot is on page 14. The caption for the graphical representation of Napoleon's march is the only place Tufte is mentioned.

Even though these examples are not Tufte's original work, but used as examples in his book, the use in Seiter's article is still improper without any reference to Tufte. While any of the examples can be excused as independent discovery, using the same arguments, using several of the same examples, and following the general outline of another person's work is plagiarism.

Michael Woodhouse
Farmington, Michigan

The article does cite the originators of each of the examples. Tufte's book used the same sources we did, which is not surprising, since they are classic examples. The reason Tufte is named in the Napoleonic example is that we were quoting Tufte's evaluation of that example's timelessness. Both of Tufte's books, *The Visual Display of Quantitative Information* and *Envisioning Information*, are must-haves for anyone doing serious data presentation. We did not cite them in the feature because our focus was on explaining issues, not naming products. Readers who wish to get either book may call Graphics Press at 203/272-9187 or 800/822-2454 or send a fax to 203/272-8600.—Ed.

An Index Is Found

REGARDING THE LETTER "LOOKing for an Index" (*Letters*, October 1992), I would like to mention MacIndex, formerly MacInfo, a Macintosh publication index, available by subscription. For $120 a year for a new subscription, you get a monthly index that includes all articles appearing in *Macworld*, *MacUser*, and *MacWeek* from February 1989 to the most recent month. The indexes are used with the software EndNote or EndNote Plus from Niles & Associates or can be exported to almost any database. You can combine the indexes as you get them, and search the index database by a variety of criteria or keywords. You can get MacIndex and EndNote by contacting Graphic Technology Research by phone at 616/473-5000 or by fax at 616/473-5002.

Michael Zolen
Sacramento, California

Thanks for the tip—MacIndex includes short abstracts of reviews and articles as well. Readers who did not see the October issue may also want to know that *Macworld* indexes (covering the previous year) ran in the January 1985, 1986, 1987, 1988, and 1990 issues, and in the February 1989 and 1992 issues. In 1991 the index did not run in the magazine, but an index covering 1990 is available: send a self-addressed, legal-size envelope with 75 cents postage to 1990 Index, *Macworld*, 501 Second St., San Francisco, CA 94107.—Ed.

Education and Technology—The Discussion Continues

We continue to receive a remarkable number of letters responding to our series of articles on education and technology (September 1992). Here are three letters received too late for inclusion in last month's column.—Ed.

THIS FALL, I WILL BE ATTENDING Georgia Tech, majoring in electrical engineering. I found your articles on the state of American schools most disturbing. The very fact that I came out of the education system you criticize so heavily, with the accomplishments I have attained, shows that the problem lies not in the system, but in the people—students and parents. Today parents are more concerned with their child being socially accepted. Parents fear having a nerd as a child, when they should fear having a failure. Parents are scared to criticize their child for fear the child will feel worthless. What about the child when he is no longer a child, but a college graduate who can't find a job he likes because he partied in college instead of going to classes and learning? Most important is the fact that most learning does not happen in the classroom at all. Learning takes place when the student is alone and figures things out for himself, instead of being spoon-fed facts by a teacher or parent. I know that in my own school career, it wasn't until I got home and began my homework that I learned what I was doing.

Scott Pagington
Spring, Texas

IF JOHNNY OR SALLY CAN'T USE THE computer between their ears, how can they use the computer on their desk? If the educational environment is not conducive to learning because of guns, drugs, and broken families, then it will not help to have a million more computers in the schools. Albert Einstein never needed a computer to do his work.

Richard Hess
Corpus Christi, Texas

I READ YOUR BLEAK ASSESSMENT of the state of educational technology, and wanted to let you know there is one piece of good news. You state in *Commentary* that "The call for an Office of Educational Research and Improvement (OERI) within the Department of Education, for example, is tragically like the never-implemented National Institute of Instructional Technology (NIIT) proposed by Congress in 1979." Although your syntax leaves me uncertain, you apparently believe that OERI is a proposal that never got off the ground. Rest assured: there is an OERI. We are trying to assert leadership in educational technology. It is not easy. But we do exist.

Diane Ravitch
Assistant Secretary and Counselor to the Secretary
Office of the Assistant Secretary for Educational Research and Improvement
Department of Education
Washington, District of Columbia

Letters should be sent to *Letters, Macworld*, 501 Second St., San Francisco, CA 94107, or electronically to CompuServe (70370,702), MCI Mail (294-8078), America Online (Macworld), or AppleLink (Macworld1). Include return address and daytime phone number. Due to the high volume of mail received, we can't respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld*.

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Circle 88 on reader service card

Art Beat

Behind Macworld's Graphics

BY CATHY ABES

Artist: Erik Adigard, with his partner, Patricia McShane, co-owns M.A.D., a graphics-and-design studio in San Francisco. This past July, some of M.A.D.'s work was featured at the Add Noise computer graphics show organized by Canon and Adobe in San Francisco.

Hardware: Mac IIfx with 32MB of RAM and a 425MB internal hard drive; Microtek MSF 300 ZS scanner; SyQuest 45MB removable-cartridge hard drive.

Software: Adobe Photoshop 2.01; Adobe Illustrator 3.2.

How It Was Done: To illustrate our comparative review of 2-D CAD packages this month, Adigard began by scanning his hand holding an architectural drawing, at 150-dots-per-inch resolution. Because he found it so difficult to precisely position his hand on the scanner and to hold it completely still during the scanning process, he had to rescan about ten times before he was finally able to get an image that looked exactly the way he wanted it.

The illustration that opens our feature on 2-D CAD on page 171.

After opening the image in Adobe Photoshop 2.01, Adigard cropped the scan and touched it up, using the rubber-stamp tool to clone the architectural drawing so that he could extend it to the top-right edge of the image. In order to intensify the contrast, he increased the color saturation of the scanned image by 50 percent.

Next he used the Inverse command (from the Select menu) to invert the colors and create a ghostlike effect—changing the hand to blue, the background to white, and the drawing to yellow. Using Adjust Hue/Saturation (under the Image menu), he changed the colors again—making the hand orange (so it would become a light tan when pasted), and the background and the drawing blue.

To create a mirror image of the original scan, Adigard copied the image, flipped it horizontally using Photoshop's Flip command (under the Image menu), and pasted the copy directly on top of the original at 50 percent opacity to allow the double image of the hands to show through.

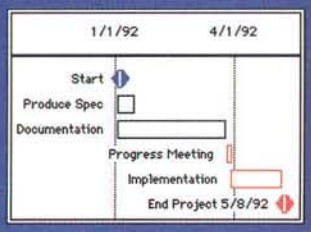
To darken the triangular area above the hands where the architectural drawing and the background overlap, he selected the area and used Adjust Color Balance (Image menu) to add more blue and red. To create a more textured effect, Adigard used the Noise filter on the triangular area, then copied the triangle with a 50-pixel feather, applied the Mosaic filter, and feathered the selection with the lasso at a 50-pixel radius. Finally, he pasted the copy on top of the original using the Lighten Only option (within the Paste Controls dialog box) to preserve the white lines in the drawing that would otherwise have been obliterated by the Mosaic filter.

After he'd finished the time-consuming operations—inverting and colorizing the images—Adigard resampled the illustration at a higher resolution (177 dpi), then did the flipping and retouching. The higher resolution was needed to give a

continues

Not Just Another Pretty Gantt Chart

Using the same data, Manager schedules completion in a fraction of the time of the less sophisticated competition.



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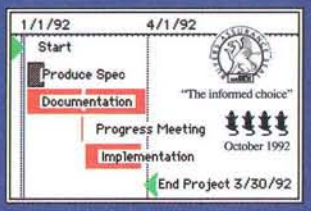

Manager accurately schedules the project for completion on March 30.

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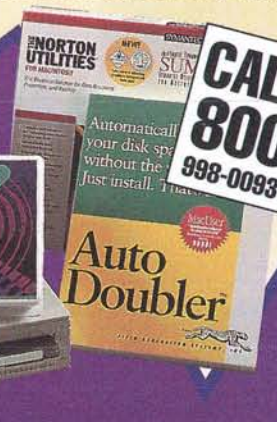

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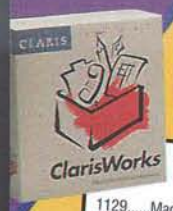

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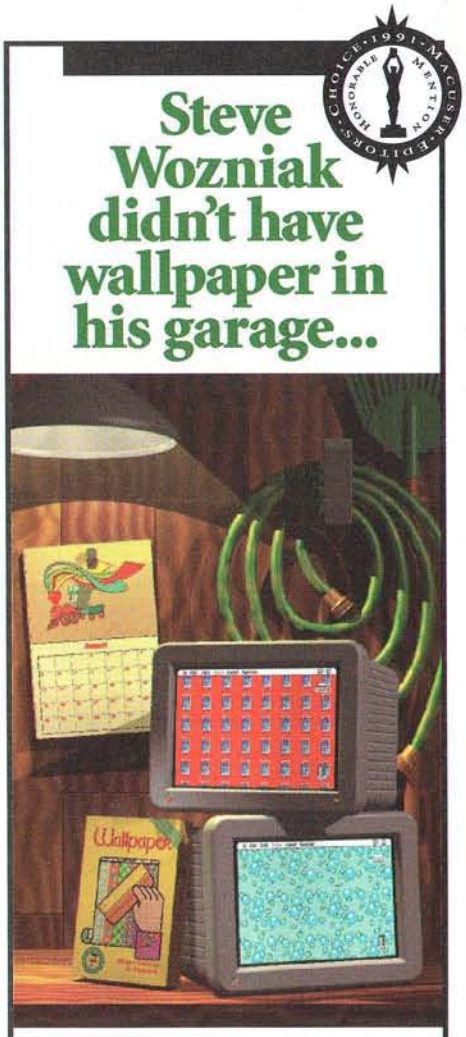

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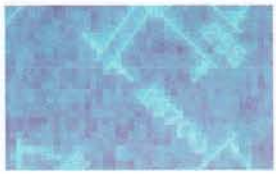
The scanned image of Erik Adigard's hand holding an architectural drawing.

The same image after it had been inverted to create a ghostly, negative effect.

After the image was copied, flipped, and pasted over the original to create a mirror image.

Adigard used the Noise and Mosaic filters and the feather to add special effects to a copy of the overlapping triangular area, which he then pasted over the original.



Top: A detail of the triangular area of the architectural drawing. Above: The scanned etching colorized, stretched, and with a frame created in Illustrator.

The image after the engraving and the architectural symbols were added but before the hands were repasted to create a positive effect.

sharper definition to the line art and the Illustrator objects that he planned to add to the illustration.

The image that appears over the hand is a small etching from a turn-of-the-century book that Adigard scanned at a high resolution (600 dpi) in gray scale. After giving the scanned image a red fill, with the Lighten Only option selected to change all the black areas to red, he used the Pen and Smudge tools and the Blur and Contrast filters to reshape the scanned etching and give it a more stylized look.

Adigard pasted the image into the illustration at 20 percent opacity and then pasted it again at 20 percent but this time with the Darken Only option, to increase the saturation of colors without affecting the lighter areas. In Illustrator he created a border, which he then imported into Photoshop to frame the image.

The yellow architectural symbols and the registration symbol were also created in Illustrator and then imported into Photoshop. First, he placed them in the illustration at 20 percent opacity. Then, using the lasso tool with a feather edge of 20 pixels to deselect various areas of the symbols, he repasted them at 70 percent opacity. The object at the top of the drawing is an architectural symbol from Adobe's Dingbat font that Adigard distorted using the Stretch command (from the Effects submenu under the Image menu).

To make the hands positive (rather than negative) he selected the hand scan (after clipping out the architectural drawing), recolored the scan, and touched it up. After selecting the background using the magic wand with a 15-pixel feather, Adigard then deleted the background, which created a glowing effect around the hands.

After selecting the original scanned hand again, Adigard pasted it behind the graphic symbols at 40 percent opacity, then flipped it and pasted it again over the other hand. Then he deselected the top of each hand using the lasso with a 40-pixel feather to fade the selection and integrate it into the rest of the illustration.

Apart from the preliminary work involved, Adigard spent about 12 hours completing the final illustration. The final file size was 8.25MB. **m**

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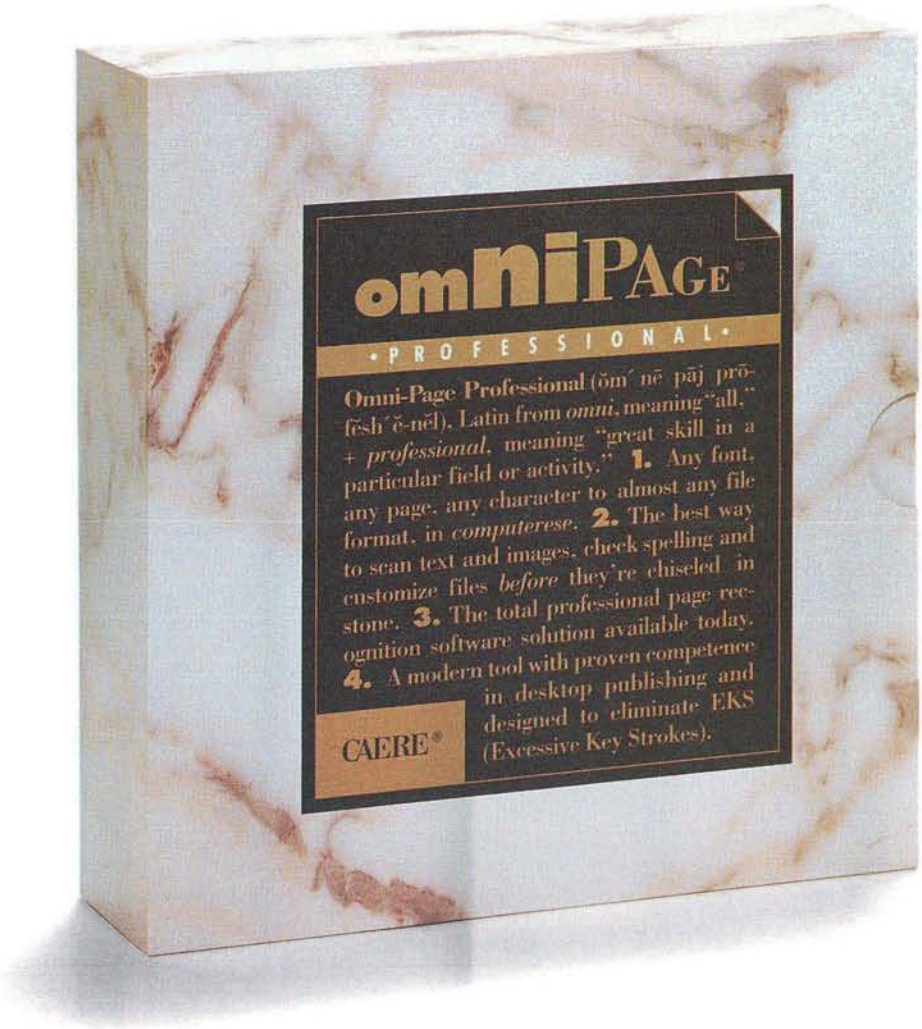

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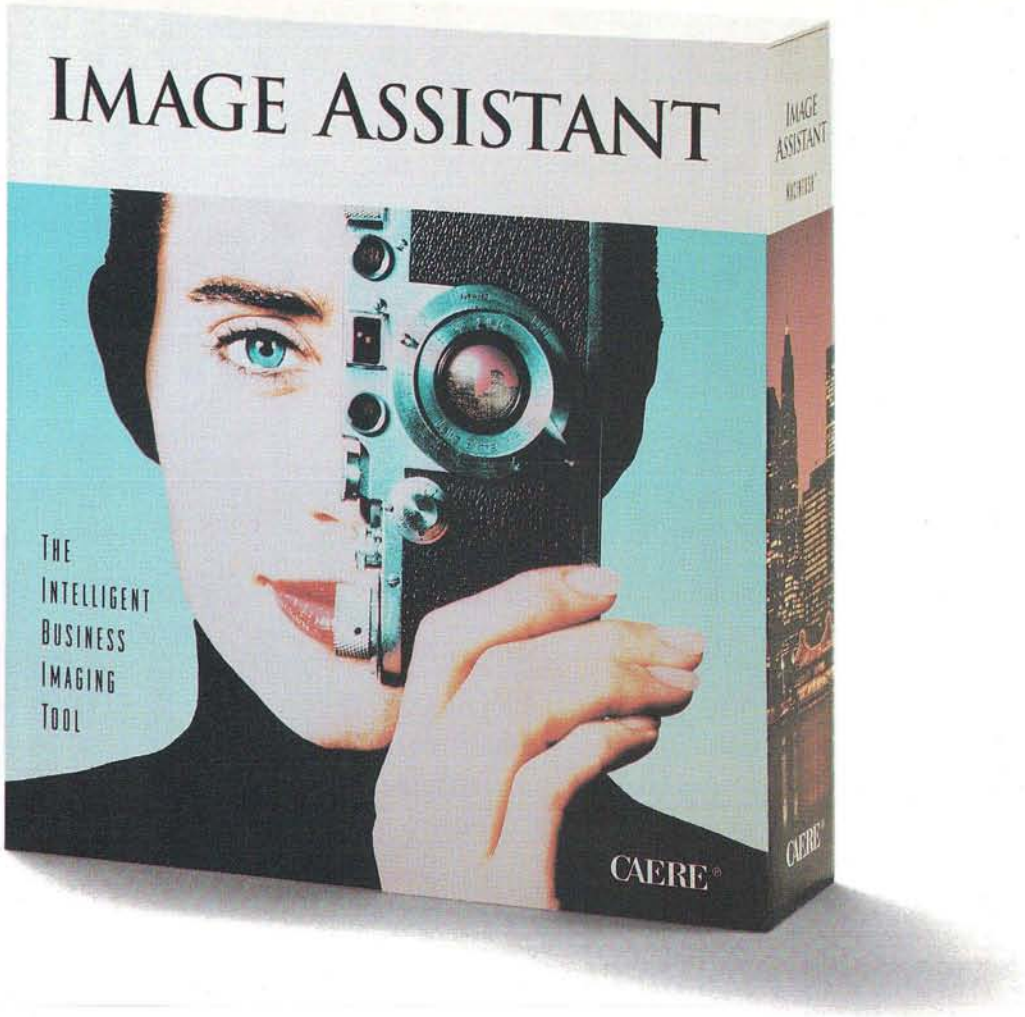

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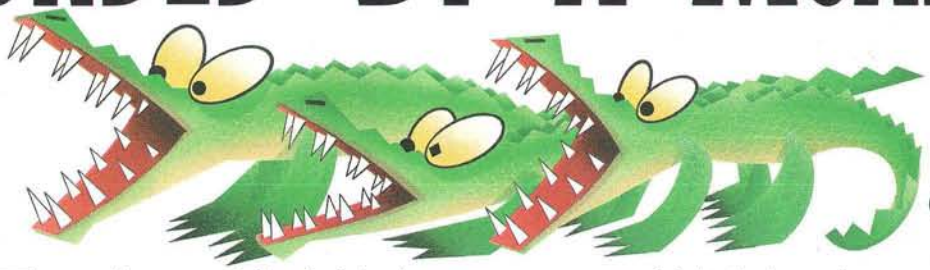
To Viruses It's Like A In Front Of An Electrified , And , Totally Surrounded By A Moat Full Of  .

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The Rap on Software Piracy

BY STEVEN LEVY

THE WAR ON SOFTWARE PIRACY began in 1975, when members of the Homebrew Computer Club (a hobbyist organization whose membership included the founders of Apple Computer) began trafficking in unauthorized paper-tape copies of a not-yet-released program called Altair BASIC. The 19-year-old recent Harvard dropout who wrote the program penned an indignant letter to the hobbyists, calling them thieves. The hobbyists howled with outrage, claiming that their efforts were justified because (1) the program hadn't shipped when promised, (2) it would cost too much when it shipped, and (3) it was something they *needed* right away. They would later insist that, far from hurting Altair BASIC, their liberal copying helped make it an industry standard, thus sending the steamed epistler on the road to moguldom. His name was Bill Gates.

That was almost 20 years ago, and now it has come to this: as seen on a video distributed by the Software Publishers Association (SPA), the industry's trade group and lobbying arm, two high-school students are about to copy a game onto a floppy disk when out from the screen pops a generic, if somewhat sanitized, rap singer who hip-hops a tune called "Don't Copy That Floppy," loaded with scratchy couplets informing the students that by their actions, they might put a programmer on the breadline.

That's right, rap music. "Yo! You can shoot a cop, but don't cop that flop!" *Chicka-chicka, scratch! scratch! Chicka-chicka, scratch! scratch!* (OK, maybe I altered the lyrics just a little.)

As the video shows, piracy is still a hot issue. But I believe that the ground has significantly shifted in this skirmish. Still, to grasp the full impact of the piracy issue requires reading the exposition of a wise, or at least a wiseass, computer columnist. And my—look where we are! So for your enlightenment and edification, I offer a few points on piracy.

But before you continue, please read the following paragraph.

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Peace in Our Time

THE BIG WAR ON ILLEGAL COPYING IS over. The publishers won. This is not to say that piracy is no longer a problem. After all, the SPA claims that over $2 billion of domestic sales are lost to illegal copying of its members' software, and $10 billion worldwide. And as SPA counsel (and part-time rap-music lyricist) Ilene Rosenthal explains, the SPA isn't making the bogus case that every pirated copy is a sale lost. Instead, it compares the number of new computers purchased in a given year with the expected number of software application purchases for a new computer, and calculates the shortfall as revenues lost to illegal copying. It can't be denied—software developers are definitely hurt by piracy.

But the very nature of computer software allows for users to make perfect copies of their applications—software wouldn't be as useful otherwise. To postulate how the industry would have grown had it been otherwise is like speculating how the airline industry might have thrived if friction did not exist to slow down its planes. In light of the ease of copying software, developers have cleverly focused their efforts on its most important market—the business and corporate world. Fortunately for those selling software, this is also the easiest place to fight piracy.

"Don't copy that floppy!" Chicka-chicka, scratch! scratch!

The very proliferation of computers in corporations works in favor of the antipiracy forces. More and more, the management of computers in large and medium-size companies is entrusted to information professionals. These people know the rules—it's part of their job to get users to work with only legal copies of software. And it's their head that gets chopped if the company gets caught.

And that's the biggest development—people are getting caught. In an effort led by large companies like Lotus and Microsoft, and a concurrent initiative spearheaded by the SPA, investigators are actively seeking out companies that routinely use illegal copies of software in the course of doing business. A big source of tips on violators is the toll-free big-brother line run by the SPA. Nothing subtle about it—the SPA urges guilt-ridden employees (or disgruntled former employees) of companies using illegal software to turn in their bosses. Once hard evidence is obtained, the SPA or the company whose software is being pirated can either pursue the violator in civil court or enlist the government's aid and actually conduct a military-style raid on the company. *"We know you're in there! Come out with your hands up and your spreadsheets open!"* The penalties, almost always limited to fines and monetary judgments to date, far exceed what it would have cost to buy the software.

As a result, according to Microsoft corporate attorney Kevin Harrang, "a lot of our [antipiracy] efforts are going toward the big corporate user." Embarrassing raids, along with hefty fines, are getting across the message that it's up to the boss to make sure that any software in the building is paid for. While it still may be acceptable for suits to swipe paper clips, only malcontents and pariahs swap pirated software inside big companies anymore. To quote the title of an instructional video (this one without the rapper) distributed by the SPA, "It's just not worth the risk."

As far as stemming piracy

continues

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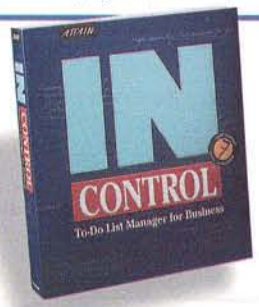

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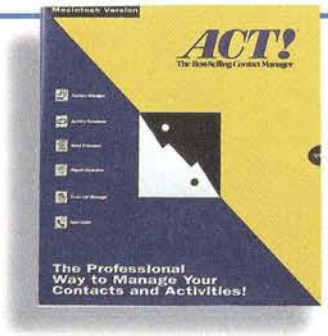

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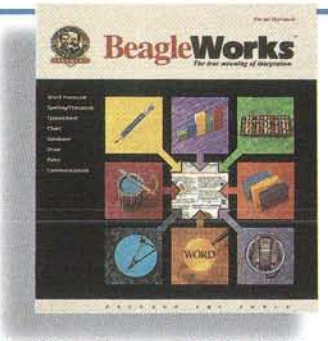

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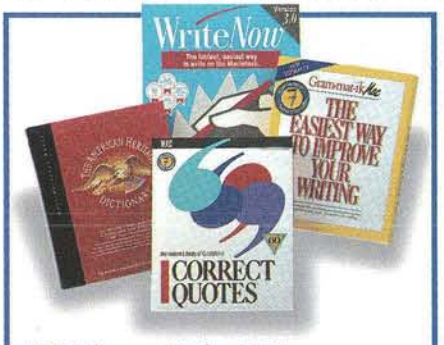

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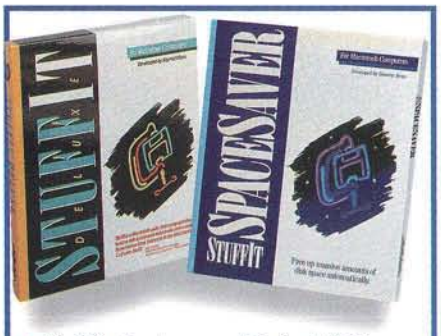

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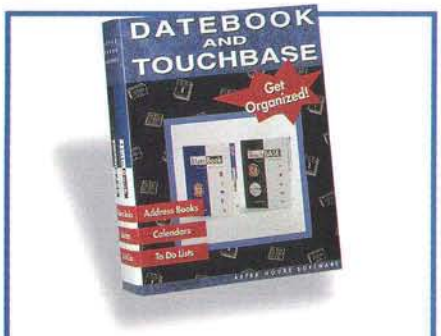

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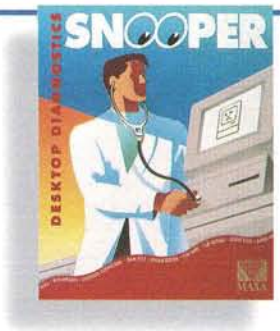

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★Apple Computer ... 30 day MBG
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1074 ❼System 7.1 *(with free video)*..... 79.
3413 ❼System 7.1 Group Upgrade Kit..... 349.
7072 ❼QuickTime Starter Kit 1.5 ..... 149.
★ASD Software ... 30 day MBG
7085 ❼FileGuard 2.7 *(1 user)* ..... 138.
★Baseline Publishing ... 30 day MBG
7783 ❼INIT Manager 33. 3114❼DiagnoSYS 39.
★Berkeley Systems ... 30 day MBG
2198 ❼More After Dark *(M.A.D.)*..... 23.
5737 ❼After Dark 2.0V 28. 2196 ❼Bundle... 39.
3392 ❼Star Trek: The Screen Saver..... 34.
★Casa Blanca Works ... 30 day MBG
1593 ❼Drive 7 2.3 ..... 49.
★CE Software ... 60 day MBG
1727 ❼CalendarMaker 3.0.1 ..... 31.
8024 ❼QuicKeys^2 2.1.2 ..... 89.
★Central Point ... 30 day MBG
5041 ❼Mac Tools Deluxe ..... 95.
★Claris ... 30 day MBG
8734 ❼HyperCard Development Kit 2.1..... 139.
★Connectix ... 30 day MBG
8441 ❼CPU *(Connectix PowerBook Utilities)*... 49.
Coral Research
7310 ❼TimeLog.... 62. 7309 *(10 Pack)*.... 399.
★Dantz Development ... 30 day MBG
3393 ❼DiskFit Pro 1.0 ..... 72.
5255 ❼Retrospect 147. 7945 ❼Remote 1.3 264.
7946 ❼Remote *(10 Pak)* 147. 3112 ❼*(50 Pak)* 649.
★Fifth Generation ... 30 day MBG
4287 ❼PYRO! 4.01 27. 3955 ❼Suitcase 2.1 53.
8286 ❼SuperLaserSpool 3.0 ..... 99.
5178 ❼FastBack Plus or 5725 ❼DiskLock... 125.
7404 ❼DiskDoubler 52. 4838 AutoDoubler.. 58.
★FWB, Inc. ... 30 day MBG
7929 ❼Hard Disk Utilities Personal Edition.... 49.
2999 ❼Hard Disk ToolKit 1.1.1..... 125.
ICOM Simulations
6296 ❼Intermission.. 29. 3731 ❼OnCue II.. 55.
★Inline Design ... 30 day MBG
1744 ❼Icon 7..... 31. 9843 ❼InSync 1.0.... 79.
7068 ❼INITPicker 3.0 ..... 49.
2913 ❼Redux 1.63.... 49. 1740 Deluxe..... 92.
Insignia Solutions
7552 ❼Rapid Trak ..... 56.
★Kent Marsh Ltd. ... 30 day MBG
9513 ❼FolderBolt 1.02 ..... 71.
★Kiwi Software ... 60 day MBG
6267 ❼KiwiENVELOPES! 3.1.6 ..... 32.
★Magic Software ... 30 day MBG
7267 ❼AutoSave II 26. 7270 ❼Backmatic.. 50.

on December 24th.

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2707 ❼*Puzzle Master*—Solve 250 New York Times crossword puzzles on your Mac. **$26.**
5910 ❼*Crossword Creator*—Create your own puzzles from a word list..... **39.**

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8692 ❼Snooper 2.0 HW & SW Kit *(Dec '92)*.. 149.
8694 ❼Snooper *(software only)* ..... 119.
★Microcom ... 30 day MBG
4803 ❼Virex/Mac.. 66. 8561 ❼911 Utilities.. 99.
★MicroMat Computer Sys. ... 30 day MBG
3732 ❼MacEKG II 2.0.5 ..... 89.
★Microspot ... 30 day MBG
8706 ❼MacPalette II..... 45.
8782 ❼MacPlot Professional..... 249.
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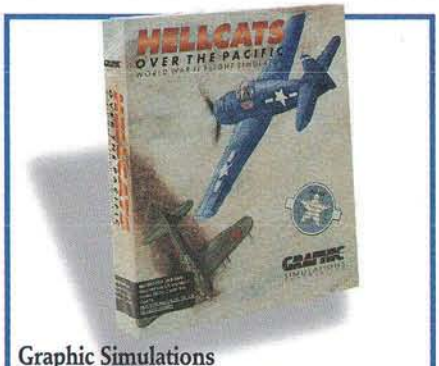
2020 ❼9 to 5 Office 19. 9767 ❼Reports 2.5 125.
★Now Software ... 30 day MBG
1793 ❼Now Up-To-Date... 65. 2366 *(10)*. 395.
6925 ❼Now Utilities 4.0.... 95. 8471 *(10)*. 775.
Palomar Software
8210 ❼PLOTTERgeist 2.1 ..... 249.
Peripheral Land, Inc. (PLI)
7326 Mac-to-DOS 3.0 ..... 99.
Pluma, Inc.
8704 ❼Cause or 8713 ❼Net Effect ..... *ea.* 185.



Graphic Simulations
4756 ❼*Hellcats Over the Pacific 1.0.3*—1992 *Macworld* Game Hall of Fame winner for Best Simulation Game, Airborne Division. Fast & fluid graphics, 256 colors & high-quality sound, transport you into the cockpit of an F6F Hellcat **$38.**

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3421 ❼THINK Pascal 165. 2688 ❼THINK C 199.
9957 ❼THINK Reference 1.0 ..... 68.
Teknosys
5203 ❼Help! ..... 88.
★TGS Systems ... 60 day MBG
6667 ❼Prograph 2.5..... 299.
★Thought I Could ... 30 day MBG
4843 ❼Wallpaper 1.0.2 ..... 37.
UserLand Software
4753 ❼Frontier 2.0 ..... 189.
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2470 ❼Lost Treasures of Infocom Vol. II..... 29.
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★Baseline Publishing ... 30 day MBG
7785 ❼Talking Moose 4.0.2 ..... 22.
Broderbund Software
6516 ❼The Playroom 2.0 *(CP) (color)*..... 29.
❼Carmen Sandiego Series *(CP)*..... *ea.* 29.
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3559 ❼SimAnt or 5871❼SimCity Supreme. *ea.* 35.
8266 ❼SimEarth 1.1 ..... 40.
1910 ❼SimLife.... 41. 3307 ❼A-Train.... 39.
Buena Vista Software
1711 ❼Heaven and Earth..... 29.
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7761 ❼Voyager II, the Dynamic Sky Simulator 99.
★Centron Software ... 30 day MBG
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5910 ❼Crossword Creator ..... 39.
8525 ❼Casino Master... 39. 8524 *(Color)*.... 45.
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2554 Mouse Yoke *(aircraft yoke adapter)*..... 29.
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3922 ❼Talking Spell It Plus..... 29.
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8278 ❼Alge-Blaster Plus..... 34.
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8050 ❼EARTHQUEST or 3118 ❼Ecology 1.0 34.
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1907 ❼PGA Golf.... 39. 2963 ❼StarFlight II .. 39.
2805 ❼PGA Golf Tournament..... 18.
★Expert Software ... 30 day MBG
6219 ❼Expert Astronomer 1.0..... 29.
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4756 ❼Hellcats Over the Pacific 1.0.3 ..... 38.
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1747 ❼Swamp Gas Europe 7652 ❼Cogito *ea.*. 37.
7646 ❼Tinies *(Nov.)* 7650 S.C.OUT *(Dec.)* *ea.* 37.
8809 ❼Tesserae 31. 3414 ❼Mutant Beach. 37.
Innerprise
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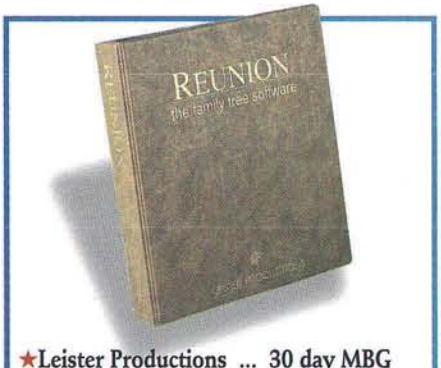
3281 ❼The Writing Center 1.0 ..... 51.
★Leister Productions ... 30 day MBG
7126 ❼Reunion 3.0 ..... 115.



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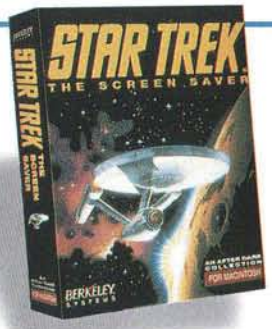

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7312 ❼Educ. Series V. 1-Animated Relativity 105.

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8257 ❼Preschool Pack - Color 2.0..... 34.
7470 ❼Jungle Quest 30. 7537 ❼Kolor Klips 37.

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8695 ❼Capitalist Pig..... 34.

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5604 ❼Finale 2.6.1..... 549.

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2717 ❼Cosmic Osmo 1.1 *(CD-ROM)*..... 37.

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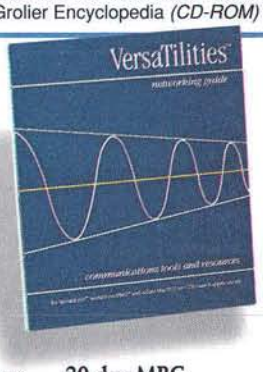

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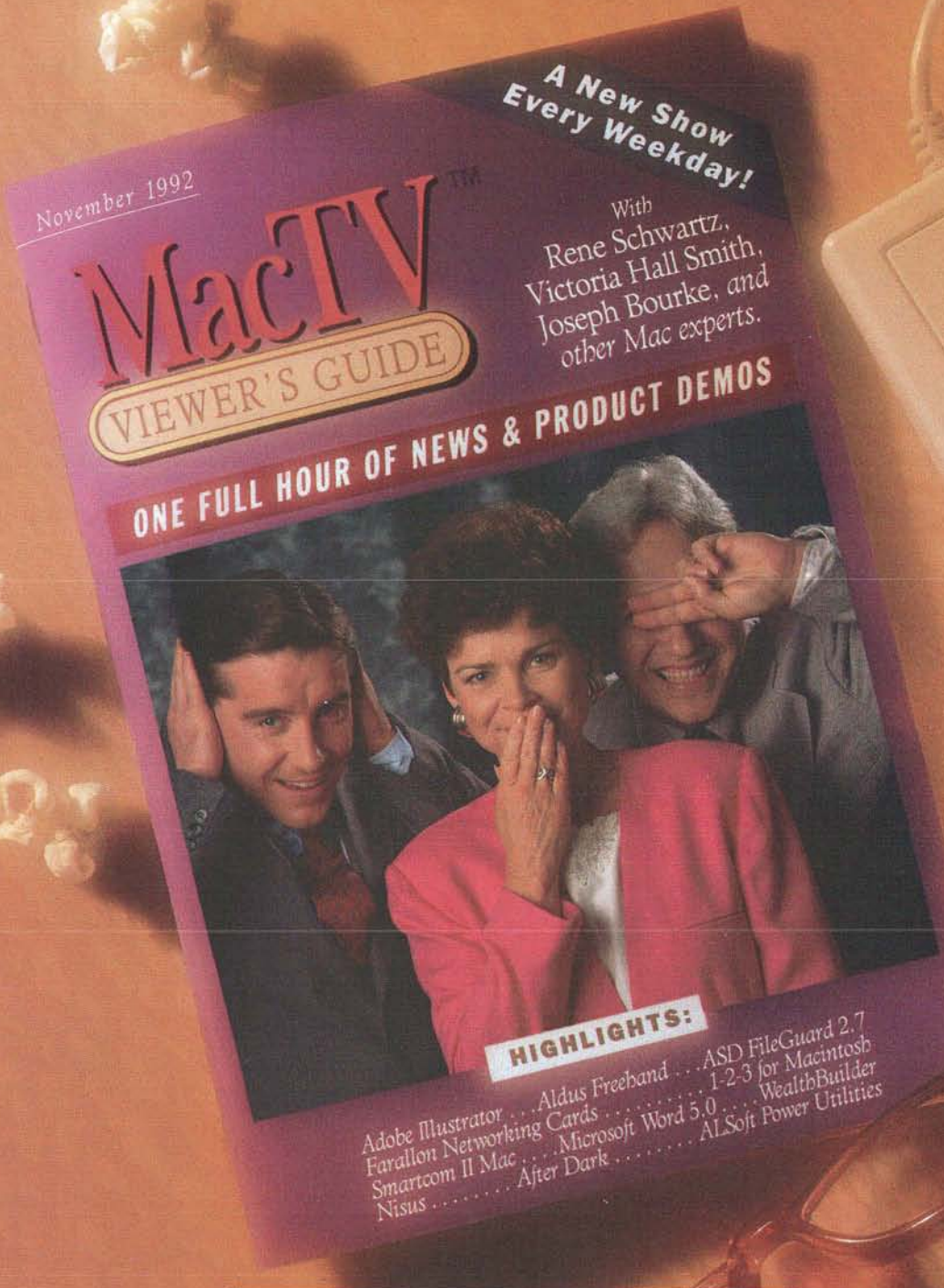

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3319 SE *(25 MHz)* 729. 3317 *(40 MHz)*.. 1119.
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7566 PocketHammer 120 699. 2314 PH 240.1169.
7570 Hammer 80is ..... 479.
7579 Hammer Int. 120is 599. 2334 240is 979.
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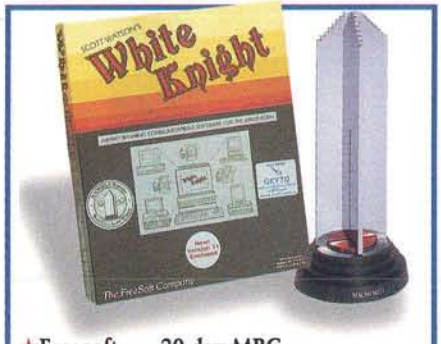
5899 1" 120 MB Port HD..... 499.
3678 120 MB Portable HD ..... 499.
3663 210 MB Portable HD ..... 739.
3662 320 MB Portable HD ..... 1129.



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8327 PLI Infinity 40 Turbo *(removable)*..... 579.
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2865 Floptical Cart. *(21 MB)* 29. 2899 *(10 pak)* 259.
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7124 120 MB..... 479. 7145 520 MB..... 1439.
7140 670 MB... 1999. 7122 1.2 GB..... 2229.
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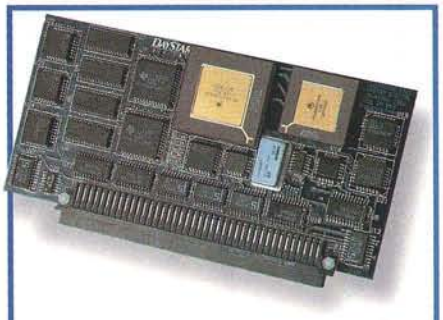

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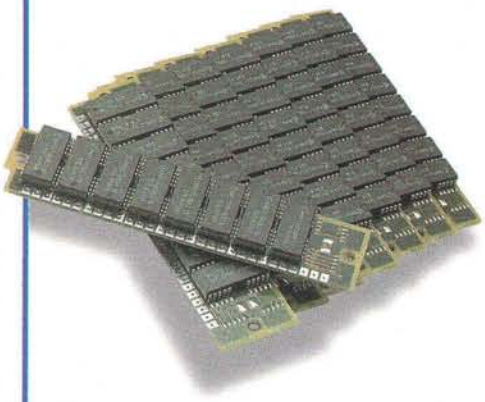

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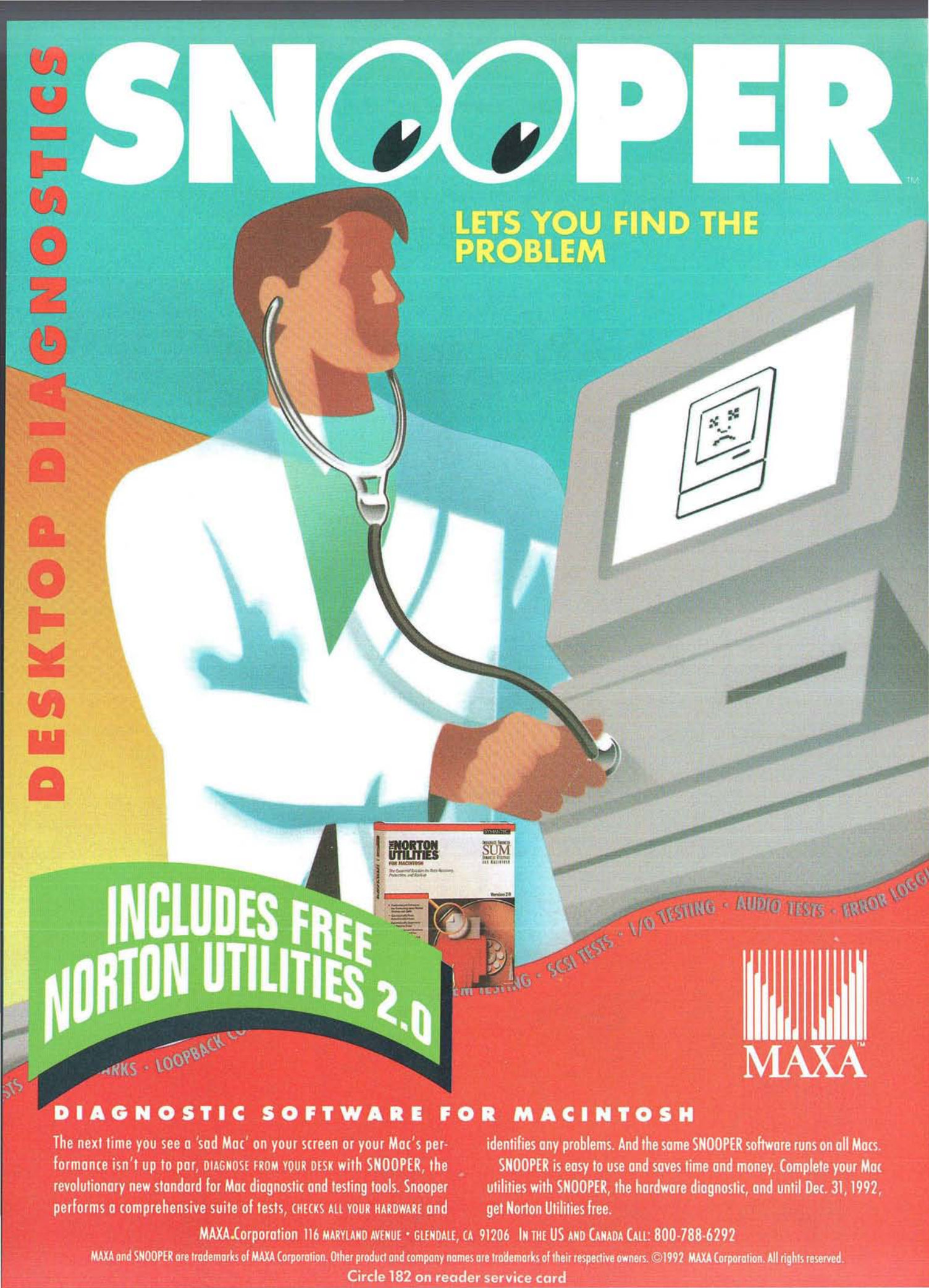
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Circle 182 on reader service card

in the corporate world, "I think we're doing all right," says Susan Wood, Claris's channel manager for corporate and educational sales. To hear someone who works for a software company actually sounding half-sanguine on the matter is an abrupt shift from the usual moaning and groaning. The tide has turned.

Poetic License

SECURE IN THEIR ULTIMATE VICTORY, the publishers are now offering concessions. There has been a lot of controversy over the license agreement, that dense shrink-wrapped gibberish that explains that you don't really own the software you just paid $695 for, and, by the way, the company doesn't promise that it will work at all. "It's not clear whether or not the shrink-wrap agreement is an enforceable contract," explains Jack Russo, a specialist in computer law, who notes that software licenses have never been definitively tested in court. But as far as restrictions on illegal copying go, the law itself is as tough as anything in a license agreement. To be specific, according to the Copyright Act—Section 117 of Title 17 of U.S. Code—legal purchasers of software are allowed to make only a single copy, and that for "archival" purposes only. This is an onerous restriction. It means that if you own a desktop machine and a laptop, and want to use your word processor on both, legally you must buy two copies.

But even the software developers realize that this goes too far. Corporate information professionals have already been successful in forcing the software industry to remove copy protection from its business products, and the next step is a revision of the software license—in the user's favor. "We now give you grants you don't have under copyright law," says Microsoft's Kevin Harrang. Chief among them is the right for one owner to use an application on two different computers. For instance, you can now have a copy of Word on both your office computer and your home machine, or your laptop.

The idea is to bring the license agreement more in line with common sense—if you don't force reasonable people into being criminals, then they will be less likely to commit the more serious violation of copying software for their colleagues. Now that Microsoft and Claris are including such provisions in their licenses, other companies have to follow suit. And why not? It's not like people have to buy separate music tapes to play on their home sound system and Walkman player.

Software developers are also showing flexibility on licensing multiple copies of software for network use. In addition, almost any developer will grant deep discounts for those seeking site licenses. There's a general recognition that the law is too restrictive, and that it's in everyone's interest to make fair deals. The ability to copy software is now accurately viewed by developers as a feature, not an inherent flaw, and software developers are becoming smart enough to see that they can get a competitive edge by granting users the ability to make legal copies.

Kid Stuff

THE LAST BATTLE IS FOR THE HEARTS and minds of the youth of America. The one area where the piracy wars still rage is entertainment software. The SPA graciously admits that "we can't go into people's homes," so the threat of getting caught is remote. Kids copy like crazy.

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continues

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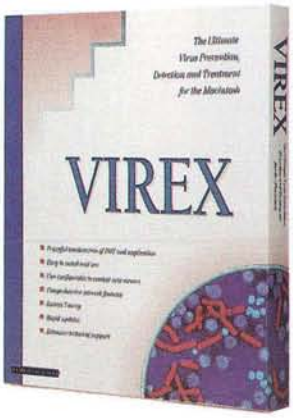

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vile practice of "off-disk copy protection." Before you can play a game, the program requires that you look up a certain word in the manual, or identify a code in a faintly printed (to prevent photocopying) list of ciphers. While this slows down some pirates (those with a bit of initiative will reproduce the decoding materials), it also makes every legal copy of the software less valuable—those who actually pay for the game have to go through a tedious process every time they play. "It's not a happy answer," admits Brøderbund spokesperson Jessica Switzer.

Some game publishers use no protection. "I don't believe in making my customers pay because other people are thieves," says Darryl Peck of Inline Design. "We're getting killed [by pirates], but I don't think we're getting killed more than anyone else."

But the SPA is pinning its hopes on education. It offers its now-notorious rap video free to schools, along with lesson plans for teachers and little buttons that say "Don't Copy That Floppy." The idea is to get young minds to view software companies as warm and fuzzy enterprises whose very existence is threatened when you make an extra copy of Might and Magic for a friend.

It is true that propaganda can be powerful. But I have spoken to enough 14-year-olds on the matter to understand that this is a case where the combination of self-interest and the lack of retribution overwhelms any budding sense of ethics. It is going to take more than the squeaky-clean rapper of the "Don't Copy" video to stop kids from software piracy—more like the equivalent of Ice-T with a shotgun.

Might Makes Right

THE RESULTS FROM THE WAR ON PIracy so far indicate that, like all wars, the winner is the one who best applies force. In the corporate market, the legal and political muscle of the SPA and its members has made a difference. As a result, the industry has been able to force the government to devote valuable law-enforcement efforts to the protection of the bottom line of those who sell software. On the other side, the focused power of corporate buyers has forced the software companies to remove copy protection and offer some slack on the license agreements. None of these factors apply in the entertainment market, so things are still in a mess. But that, too, is only temporary, because eventually, new technology will reduce the problem.

"In the long term, we're looking at technology, and hardware-based solutions," says Kirk Loevner, vice president of Apple's developer group. You'll see more software delivered on uncopiable CD ROMs, or even, as Loevner envisions, hardware keys inside computers that allow only legally purchased copies of software to be run.

Even these new technologies are not going to be enough to solve the problem. If whizbang antipiracy schemes reduce the usefulness of the software itself (as copy protection does), buyers will not accept them.

The free-flowing nature of software itself dictates that any resolution of the software piracy problem is destined to be a compromise between freedom and enforcement. Amazingly, almost everyone involved—with the possible exception of 14-year-olds—seems to realize this. And once those little code-snatchers grow up and get lawyers, they'll realize it, too. **m**

STEVEN LEVY's most recent book is *Artificial Life: The Quest for a New Creation* (Pantheon, 1992).

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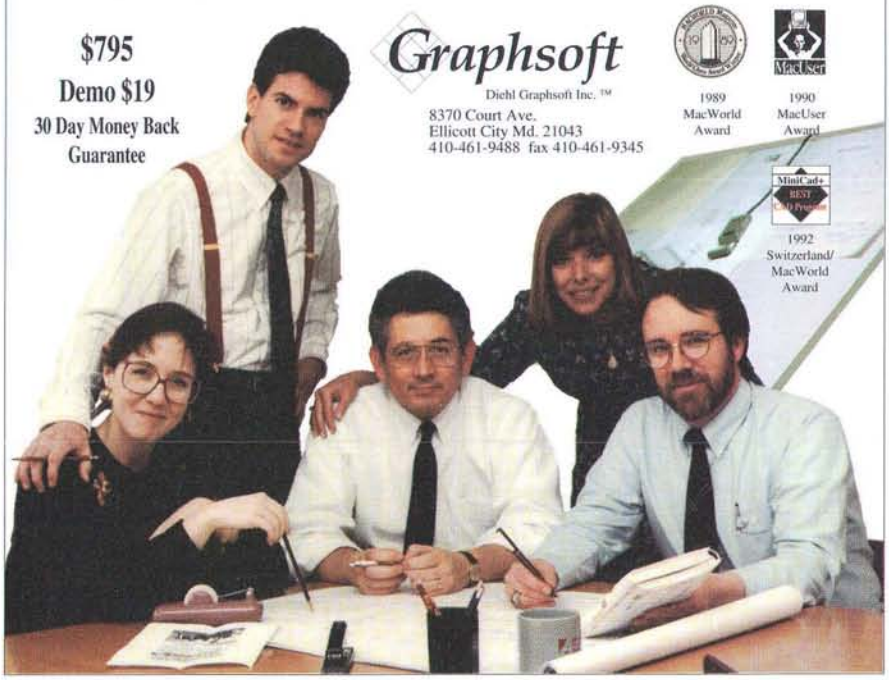

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Completely Organize Your Financial Life and Put Yourself in Control

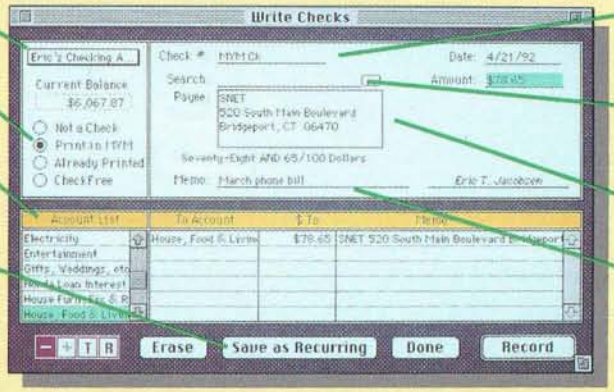
NEW Version 5.0 for the Macintosh...

Bank Account
Set up as many as you like. Print out a consolidated report of multiple accounts.

Type of Transaction
Pay bills by check or electronically via your modem.

Account List
Link your bills to an infinite number of budget categories. "Speed scroll" through your customized list in a split second.

Save As Recurring
If this is a payment you make over and over, the program can automatically remind you.

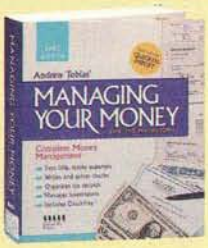


Check Number
Automatically entered, but you can easily override it to track more than one series of check numbers.

Payee
"Remembers" every check you've ever written. Enter it once, and with "Payee Search," you never have to enter it again.

Address
Prints it on your check, plus remembers it for future use.

Memo
Enter a brief description or expand it into a memo of any length.



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Managing Your Money takes just minutes to master and start using. You'll enjoy nearly instant control over your finances. You'll know where your money is... where it's going... and why.

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- Set up and maintain your budget. Compare your expenses against budget.
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System Requirements:
Macintosh — System 6.0.2 or later. System 7 compatible. Mac Plus or later. 2MB of memory recommended. 3MB of free hard disk space for installation. Macintosh version does not perform all of the functions in DOS version.
DOS — IBM PC, XT, AT, PS/1, PS/2 or IBM-compatible. DOS 3.0 or later. 512K RAM. Hard Disk.All rights reserved.

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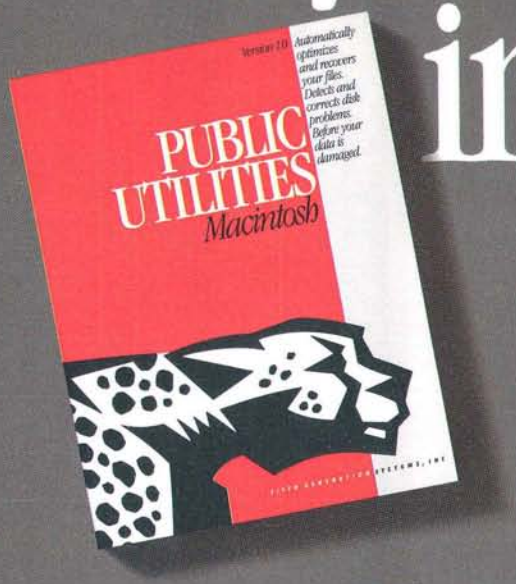

Owning most utility software packages is like belonging to the Auto Club.

If your system crashes, or if you have an accident with your data, they can come to your rescue.

But before you get back up and running, you have to spend a lot of time waiting by the side of the road.

Which is why Public Utilities,™ the ingenious new package from the creators of Suitcase,™ is the utility every Macintosh® has been waiting for.

Instead of getting you back up and running, Public Utilities concentrates on *keeping* you up and running.

How?

By automatically finding and fixing potential disk and data corruption problems *before* they leave you stranded.

Every half hour (more often if you're cautious, less often if you're a daredevil) Public Utilities performs a detailed diagnostic scan of your disk.

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(You may also gasp, sigh, and pat yourself on the back for ordering Public Utilities as soon as you heard about it.)

It doesn't take an MIS type to appreciate what Public Utilities can mean in higher productivity and lower support costs.

But if you *are* an MIS type, you'll be delighted to know that, in addition to protecting your people from disaster, Public Utilities reminds them to do prudent things like perform regular backups, update their passwords and optimize their hard disks.

It even launches the requisite software for them, at a stroke.

(If the requisite software doesn't happen to be a Fifth Generation product, Public Utilities will launch it anyway.)

Of course, even Public Utilities can't prevent people from deleting their files or reformatting their hard disks.

But it can bail them out of more difficult situations than any other utility software.

And unlike other programs, it won't *let* them get into difficult situations.

That's because we left out Sector Editors and other such high end, high risk things. And put in plenty of on-line HELP.

Naturally, we made it System 7 savvy, so you can utilize such helpful features as virtual memory and Apple Events.

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Which is what you use to get out of trouble *after* you get into it.

To get you back up and running promptly, Public Utilities offers the most complete after-the-fact diagnosis and repair.

Public Utilities automatically finds, detects and repairs a range of common disk problems before they crash your system.

Accidentally delete a file or reformat your hard disk? Not to worry. Public Utilities can help you recover.

When Finder can't find it, or your word processor can't read it, your best shot at salvaging that valuable file is Public Utilities.

To make sure you get the highest performance, Public Utilities packs an automatic disk optimizer.

FIFTH GENERATION SYSTEMS, INC

Circle 130 on reader service card

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A Roll Call of Saints and Sinners

BY DEBORAH BRANSCUM

WHERE DID THE YEAR go? Once again, it's time to review the Macintosh scene and take a look at industry saints and sinners as 1992 slouches toward its end. Despite a bad economy, Apple's fortunes were up this year; IBM's were down; and consumers everywhere faced mixed blessings in the areas of quality, service, and support. Listings are in alphabetical order; the halo icons indicate companies with angelic behavior, while the horns indicate a devilish bent.

Like most of us, *Apple* is both a saint and a sinner. On the saintly side, in 1992 Apple decided to include a year of toll-free tech support for those who buy or upgrade to System 7.1, as well as for Performa buyers. Performa buyers also get one year of in-house service. If the company can't solve the problem over the phone lines within 24 hours, it sends someone out to your home to deal with it. The company's PowerBook repair program has an excellent track record, and Apple acted promptly to inform users of potential problems with exposed PowerBook batteries and with a small number of PowerBook 100s. The environment got a boost when earlier this year Apple completely eliminated the use of chlorofluorocarbons in all of its manufacturing operations, and established a laser-cartridge recycling program. Perhaps most important to Macintosh users, the company continued to cut prices and introduce exciting new models.

Apple's decision not to warn users before purchase about the occurrence of broken pixels in PowerBook 170 displays was stupid. But the true sin was refusing to let users return the computers—except under narrow circumstances—if they found the flaws unacceptable. Another sin: Apple changed its policy so that user groups and online services may no longer distribute system software free of charge or for a nominal fee. It may be a sound financial decision for Apple, but it costs consumers more and robs some user groups of the modest income that helps them stay afloat. It's not a mortal sin, perhaps, but selling Performa computers without system software disks is a silly idea. If anything goes wrong, there are no disks to fall back on—and things do go wrong. More irritating was Apple's release of AppleShare 3, which was incompatible with CE Software's QuickMail. That meant the ubiquitous networking system for the Macintosh could not peaceably coexist on the same server with the most popular Macintosh electronic-mail system, causing problems for users of both. (Fortunately, AppleShare 3.1 solved that problem.) Security is a much more serious issue: on a server, AppleShare no longer requires a password before someone can access sensitive files via a network server. (It was a necessary trade-off so network servers could manage other functions as well, according to AppleShare engineering manager Chris Zuleeg. He points out that the password requirement of earlier versions of AppleShare could be avoided by starting the network server from a floppy disk. His advice: if you're really concerned about security, lock up the server.) Another Apple transgression this year was releasing System 7 Tune-Up Version 1.1, a crash-meister the company quickly recalled and replaced with 1.1.1.

Still, that was a passing problem. Those who travel to Japan and hope to use their PowerBooks and Apple fax modems while in the country may be in for a more lasting disappointment. Despite Apple dealers' advice to the contrary, the PowerBook fax modems are not designed for international use. One Apple customer, who travels to Japan frequently, simply could not get his fax modem to function. Apple's workaround is a visit to your dealer before and after each visit for a switch adjustment.

Baseline Publishing, Peachpit Press, and T/Maker Company are all saints for their money-back guarantees. Customers dissatisfied with their purchases have 30 days to return software and books from Baseline and Peachpit, respectively. T/Maker doubles that period by giving WriteNow upgrade owners a 60-day money-back guarantee.

Who's been naughty and who's been nice? It's time again to examine good deeds and bad.

The very first users of BeagleWorks 1.0 found themselves bedeviled by bugs. But *Beagle Bros* did the right thing by suspending sales, then shipping free upgrades to its customers. (The program was recently sold to WordPerfect, which will market it under another name.)

Bridgette Inc. and Michael Ehman have sinned by refusing to honor Ehman Inc. product warranties. According to reports from two readers, Bridgette has reneged on its promises to take care of their warranty repairs.

Envisio sinned this year by not recalling early, defective models of its Notebook Display Adapter. *Macworld*'s reviewer was greeted by smoke from his PowerBook keyboard after the tiny Envisio circuit board was installed—unfortunately, he wasn't alone. Envisio repaired any damaged PowerBooks for their owners at no cost, and the defect was eliminated in later models. But a problem of this magnitude called for a swift, public recall of the defective product. (Last fall the company discontinued the product, which had received less-than-glowing reviews.)

Grolier Electronic Publishing, WordPerfect, and other companies that offer toll-free technical support are surely saints (hopefully not tattered saints, as the costs of support go up).

Mail-order company *MacSource* appears to be a serious sinner. At press time, MacSource's main line is busy round the clock and the tech-support line goes unanswered. Several readers have called in concern because of overdue product orders. MacSource officials were unavailable for comment. If it turns out that the company is in trouble, customers who paid by money order or check stand to lose big time. Please remember—always use a credit card when buying by mail.

continues

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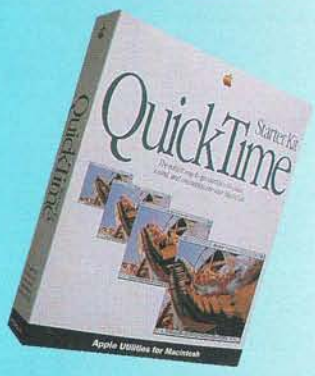
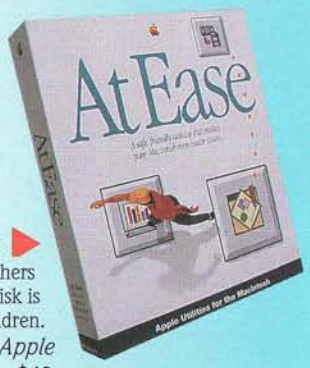


QuickTime Starter Kit

Apple Includes everything you need to get started with QuickTime – the QuickTime INIT, Movie Player, Movie Converter, PICT Compressor, and a CD-ROM full of QuickTime movies you can integrate into your work. Also comes with a full manual on using QuickTime.

Apple

4608 QuickTime .....$158.

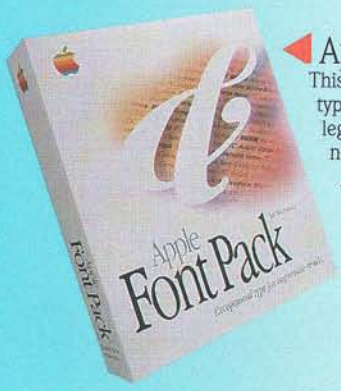


At Ease

New! Put your mind at ease. You choose which applications you'll allow others to access and put them on the At Ease desktop. The rest of your hard disk is protected by a password. Great for homes with computers and children.

Apple

5247 At Ease .....$49.

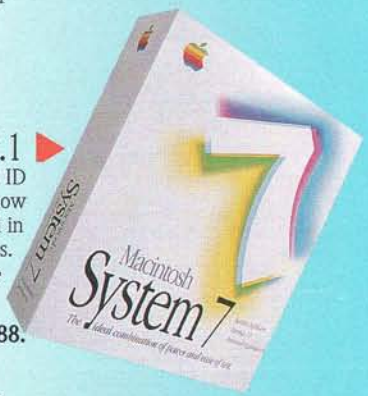


Apple Font Pack

This is a carefully chosen selection of 43 TrueType fonts from the word's leading type foundries. They are expertly crafted to provide excellent results – maximum legibility on screen and crisp output on paper. The Apple Font Pack includes new display, text, and symbol faces to give you a wide range of type choices.

Apple

5248 Apple Font Pack.....$84.



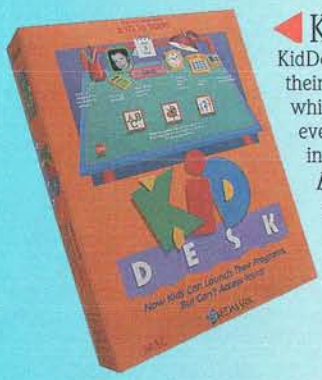
System 7.1

New! Check out the new features. A new Fonts folder will resolve font ID conflicts automatically. Complex character sets such as Japanese are now supported by World Script. Also includes the all the fixes now included in the System 7 Tune-Up extensions.

Apple

5255 System 7.1 .....$98.

5485 System 7.1 Multipack.....$388.



KidDesk

KidDesk was designed by early childhood experts to give kids creative control over their computing environment – without putting yours at risk. Parents select which programs appear on KidDesk from those installed on the hard drive. Then even young children can launch their own software programs and learn by playing with the KidDesk accessories.

Edmark

5182 KidDesk .....$28.

COMstation Five V.32bis

Just point and click to fax. If you can print a Mac document, then you can fax with COMstation Five. Plus you can keep working in any application while you send and receive faxes. And if you receive a crucial document by fax that needs editing, you don't have to re-key it. That's because optical character recognition (OCR) is a built-in feature.

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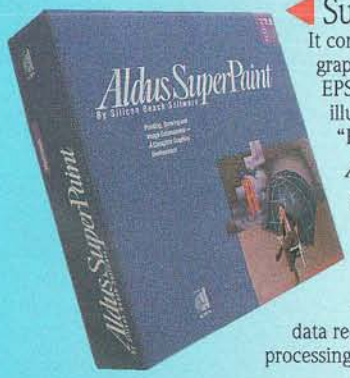
5340 COMstation Five ....$448.



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It combines painting, drawing, and image enhancement in one powerful, easy-to-use graphics program. With 24-bit color, textures, gradients, and full color TIFF and EPS graphics support, SuperPaint is ideal for anything from the simplest business illustrations to sophisticated full-color art. A six time winner of *Macworld's* "Readers Choice Award!"

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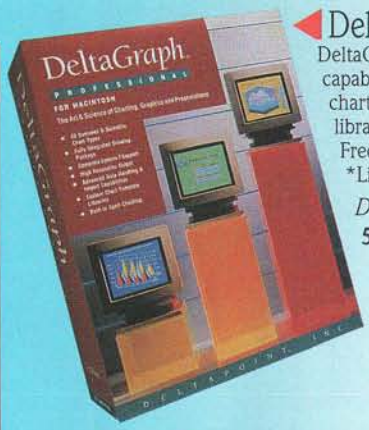

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DeltaGraph Professional brings you 40 different chart types, with 80 subtypes, and full slide show capabilities in a comprehensive yet easy-to-use program. It handles standard pie, bar, and line charts, and ternary, spider, and bubble charts. It also features preformatted chart and clip art libraries, and extensive data importing capabilities.

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*Limited time offer.

DeltaPoint

5098 DeltaGraph Professional/TI-68 calculator $198

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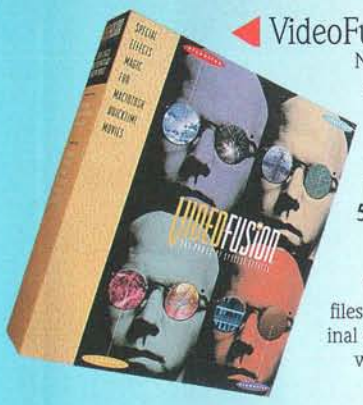
IOMEGA

5012 Bernoulli MacTransportable 90 PRO .....$499.



VideoFusion

Now the same special effects you've seen in television and film presentations can be created on your Macintosh. VideoFusion lets you add magic to your QuickTime movies, video productions, and presentations. Using standard Mac terminology like "cut," "copy," and "paste," you can apply the latest special effects from VideoFusion's library or create your own.

VideoFusion

5165 VideoFusion .....$448.

TimesTwo

TimesTwo actually makes your hard disk bigger rather than making your files smaller! A one-time installation converts your hard disk to twice its original size in minutes, leaving your data unchanged. It's completely compatible with all Mac software and works with all SCSI and erasable optical disks.

Golden Triangle

5233 TimesTwo.....$99.

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Create stunning 2D and 3D designs in a fraction of the time of other programs. In just a few hours you can easily create full-color, gray scale, or black-and-white designs. Use your designs for engineering, animation, desktop publishing, multimedia, and more. If you can conceive of an idea, DesignCAD gives you the power to create it.

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Specular

4818 Infini-D 2.0 .....$648.

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Fractal Design/Wacom Technology

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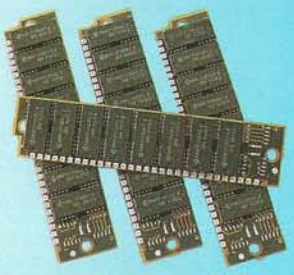
SIMMs



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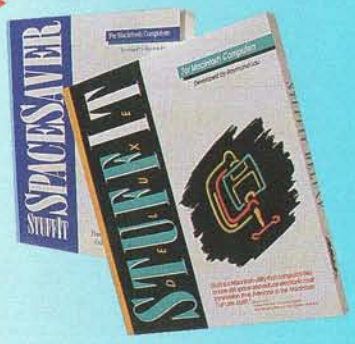
After Hours

5002 TouchBASE/DateBook bundle .....$98.

StuffIt Space Saver/StuffIt Deluxe 3.0

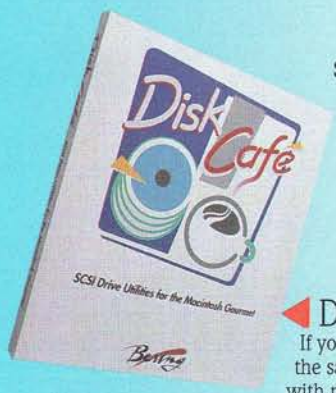


StuffIt SpaceSaver provides complete on-the-fly compression. Increases disk space (with lightning speed) without effort on your part. **StuffIt Deluxe**, the most efficient compression product available, solves all your compression needs, from archiving to transparent compression, and includes StuffIt SpaceSaver.

Aladdin Systems ○

4971 Stuffit Deluxe .....$68.

4969 Stuffit SpaceSaver .....$38.



Disk Café

If you use drives from different manufacturers, you need to format them all with the same utility. Disk Café is a complete storage formatting utility that works with nearly every drive available. So it can prevent compatibility problems including data loss. And its advanced diagnostic tools detect and repair disk defects.

Bering

5121 Disk Cafe .....$45.

DiskFit Direct

DiskFit Direct is a fast, easy, and affordable backup for your Macintosh. Launch it, click "BackUp," and insert disks. DiskFit Direct creates an exact copy of your hard disk in Finder format on any removeable disk, including floppies and SyQuests.

Dantz ○

5491 DiskFit Direct .....$32.

HayesConnect/SmartCom II

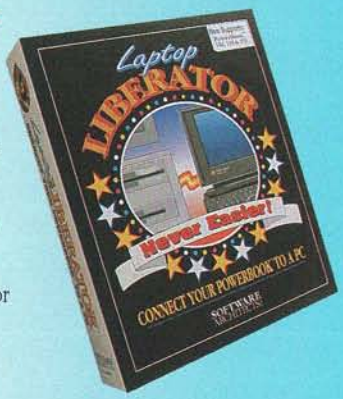
HayesConnect-Network serial device sharing software allows any serial device to be shared over a network from a server. **SmartCom II**-Communications program features error-free transfers via Hayes Verification, XMODEM, MacTerminal XMODEM, VT 100/102, VT52, & TTY emulation. Plus many other features!

Hayes

4314 HayesConnect.....$74.

1628 SmartCom II 3.3 .....$83.

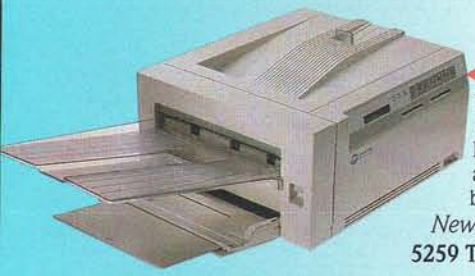
Laptop Liberator



Use your PowerBook like never before. With Laptop Liberator, any PowerBook can act as an external hard drive. Connect it to a desktop Mac or PC and transfer files back and forth. Laptop Liberator uses a PowerBridge connector and an Apple SCSI Disk Adapter to make the connection.

Software Architects

5267 Laptop Liberator.....$198.



TurboPS/400P

The TurboPS/400P produces brilliant 400 by 400 dpi – almost twice the resolution of standard 300 dpi laser printers. Add to that Image Enhancement Technology to smooth characters, sharpen curves and angles, and eliminate jagged lines. It's ideal for the desktop publisher or business graphics user.

NewGen Systems

5259 TurboPS/400P .....$1898.

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Snooper/Norton Utilities for Mac

Find problems fast with Snooper, the revolutionary suite of hardware diagnostic and testing tools. And for a limited time, get Norton Utilities For Mac FREE. Snooper is easy-to-use, powerful, and saves you time and money. No set of Mac utilities is complete without Snooper, the hardware diagnostic.

Maxa

5349 Snooper w/ Norton Bundle.....$118.
5350 SnooperKit w/ Norton Bundle .$148.

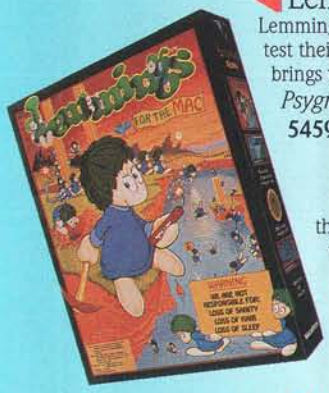
Daymaker

New version! Daymaker 2.0 is faster and filled with new features. A Recurring Events function schedules upcoming events with more flexibility. The "To Do" view organizes "to do" items. Reports can be previewed before printing and will be sharper with integrated DYNoPAGE.

Pastel ○

5261 Daymaker 2.0.....$82.

Lemmings

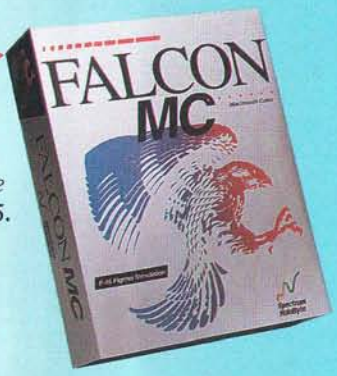


Lemmings for the Mac has arrived! Now Mac owners can demonstrate their game playing smarts and test their sanity, saving mobs of imperiled green-haired rodents from certain doom. Lemmings for the Mac brings you 120 levels of original and intellectually challenging gameplay.

Psygnosys

5459 Lemmings.....$35.

Falcon MC



Now you can experience the colorful, high-flying thrill of an F-16 fighter. More than 12 missions put you into instant action. Engage in a dogfight with a MiG 29, while dodging anti-aircraft missiles. Then knock out enemy resources – factories, power plants, tanks, truck convoys. In full color.

Spectrum HoloByte

5382 Falcon MC.....$45.

The Miracle

This is the first keyboard that teaches you how to play it! It makes learning even the basics a pleasure. Includes a professional keyboard with 49 standard-sized velocity-sensitive keys, 128 digitized instruments and sounds, full MIDI compatibility, hundreds of songs and lessons, and full orchestral accompaniment.

The Software Toolworks

4072 The Miracle .....$378.

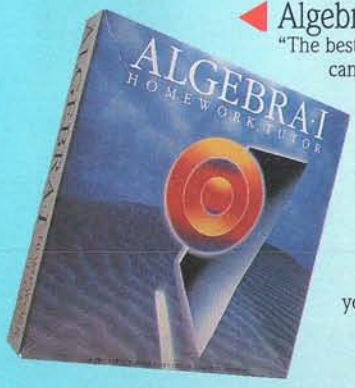
Spaceship Warlock/Creepy Castle

Spaceship Warlock is 125 megabytes of graphics, animation, and original music in a science fiction "interactive movie" adventure game. 1991 Game Hall of Fame "Best CD-ROM" award from *Macworld*. **Creepy Castle** is an arcade style action/adventure game featuring animated monsters, dual voice digitized sound effects, four challenging scenarios, and four levels of difficulty.

Reactor, Inc.

5100 Spaceship Warlock.....$58.
4079 Creepy Castle .....$32.

Algebra I



"The best algebra tutorial program I have seen." (*Macworld*, 4-91) This program can generate problems or take problems from a student's own text book. Students are checked on every step toward the solution and can request a series of increasingly more specific hints when they have trouble.

Missing Link ○

5150 Algebra I.....$49.

Get hooked on Diamonds.

"The most addictive game since Crystal Quest." (Bob Levitus, *MacUser*) Diamonds 2.0 is a challenging and entertaining game for all ages. Try to work your way through 30 levels of intense challenge and excitement. There's even a built-in editor so you can create your own fun levels.

Varcon Systems

5162 Diamonds 2.0 (pictured) .....$26.
5461 Jewelbox.....$26.
5462 Aces with Tens.....$26.

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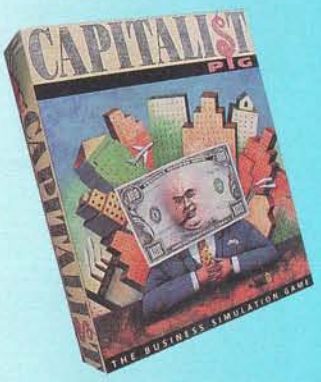
Capitalist Pig

This thought-provoking business simulation lets you start and run a business in the privacy and saftey of your own computer. Choose your company name, stock logo, product, and source of capital. Then set your business, financial, and marketing plans – the clock starts ticking and you're in business!

Pluma

4640 Capitalist Pig .....$34.



PAX IMPERIA

Experience a universe of adventure and conquest. Rule an expanding empire while pursuing diplomatic relations with other emperors in neighboring star systems. Race for technological advancement and planetary discovery. Go where no Mac has gone before!

Changeling Software

4992 Pax Imperia .....$34.

Aesopolis

Bring Aesop's fables to life with multimedia. This enchanting CD-ROM features a stunning virtual museum with thousands of splendid color canvases and high fidelity sounds. Double-clicking on one of the artworks reveals both screen-written and spoken versions of the fables.

Quantum Leap

4870 Aesopolis.....$49.

Be the hero of your empire!

Warlords is a fight to the finish where only one of eight empires will prevail! Starting from your home castle you ruthlessly expand your territory and eliminate all other players. Train sixteen different army types ranging from conventional infantry to dragons. Use your wits to out-think and out-fight cruel and wily opponents. "Best Wargame of the Year" – *Computer Gaming World Magazine.*

Strategic Studies Group

3933 Warlords .....$38.

Strategic Conquest and Spaceword Ho!

Spaceward Ho! 2.0 challenges you to colonize the galaxy against up to 20 computer players or human opponents on a network. Build fleets, research technologies, and conquer new worlds. **Strategic Conquest 3.0** is the latest version of the classic game of military stratagy. Maneuver armies, planes, and boats to conquer every island and continent against the computer or a friend.

Delta Tao ○

4057 Spaceword Ho! .....$37.
2891 Strategic Conquest .....$37.

Hellcats and Mission at Leyte Gulf

Hellcats is the most realistic flight simulator ever! In **Missions At Leyte Gulf**, you load your Hellcat with torpedoes, rockets, or bombs. Support a ground assault and neutralize enemy tanks and ground vehicles, or protect your fleet positions against sub attacks.

Graphic Simulations

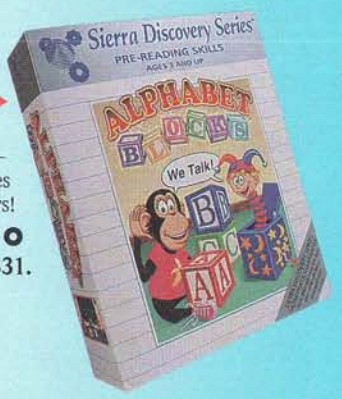
4070 Hellcats Over the Pacific .....$39.
4998 Missions at Leyte Gulf .....$22.

Alphabet Blocks

Now any child who can use a mouse can learn to read with Alphabet Blocks. In this fun introduction to alphabet sounds and names, two computer friends – a chimp and a jack-in-the-box – gently coach your child through the basic rules of reading. Kids have a great time with these infinitely patient tutors!

Sierra On-Line ○

5533 Alphabet Blocks.....$31.



Victor, Vector & Yondo: The Vampire's Coffin

New! This adventure on CD-ROM integrates spectacular live action, sound, and music! Your mission is to retrieve Dracula's coffin while fending off evil beings. Truly interact with the play environment and use your creativity, skill, and intelligence to overcome obstacles.

Sanctuary Woods

5168 Victor, Vector & Yondo: The Vampire's Coffin .....$39.

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Great hard drives and free utilites from Mac's Place

The longer you own your Mac, the more you'll find yourself wanting more hard drive space. Our DataPlace Hard Drives, bundled with four free utilities, offer an elegant and reliable solution. These are the most reliable drives around, preformatted using the latest technology in formattting software. And they're fast too. The two removable drives feature mechanisms from SyQuest, and they come with one free SyQuest cartridge. All DP+ drives feature a sturdy case, two metal-clad SCSI connectors, an external fuse, and an easily accessible SCSI ID switch.

Each comes with manuals, cables, a two to five-year warranty,* and instant technical support from Mac's Place. And if your drive should need warranty repair, Mac's Place will give you a free loaner. All drives come with MacTools 2.0, DP Formatter Plus, StuffIt SpaceSaver, and Kaboom! SE.

Drives are pre-formatted with DP Formatter Plus so they're ready to use right out of the box.

MacTools 2.0 is all the utility you'll ever need. It performs scheduled backups and disk analysis, speeds data access by defragmenting files, detects and cleans known Mac viruses, and much more. SpaceSaver compresses your files and folders so you have double the disk space! It compresses files an average of 50% and some graphics files as much as 98%. SpaceSaver automatically decompresses files when you open them and compresses them again when you're done.

You'll find a myriad of sounds to make your Mac fun with Kaboom! SE. Each sound can be played when you start up your computer, insert disks, empty the trash, and more! Get great drives with great utilities and all the support you need from Mac's Place.

Removable SyQuest Hard Drives

4197 DP+ 44MB w/Cartridge.....$508.
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DataPlace ○

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5297 DP+ 2000MB Hewlett-Packard .....$3728.

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5298 DP+ 220MB Hewlett-Packard $852.
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5300 DP+ 1003MB Hewlett-Packard.....$2238.

*Quantum drives come with a two-year warranty, Hewlett-Packard with a five-year warranty.

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Batteries Technology
5196 ....$78.

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Small-arms infantry combat.
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Earn your wings in WWI.
Sierra On-Line
4737 ....$40.

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Sierra On-Line
4030 ....$40.

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150 wild and wacky sounds.
Nova
4491 ....$28.

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A complete publishing toolkit.
Agfa
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The best way to do your taxes.
ChipSoft
5486 ....$49.

Performance PowerBook Case
An organizer built to protect and transport your PowerBook.
Solidex
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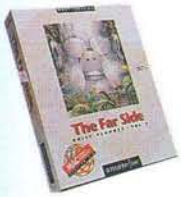

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With 365 hilarious cartoons.
Amaze!nc
5348 .....$49.

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3-button ADB trackball. Ergonomically desgined.
MicroSpeed ○
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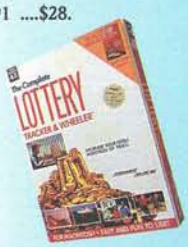

Complete Lottery Tracker & Wheeler 4.0
The most comprehensive lottery software.
Triad Publishing, Ltd.
4578 ....$29.

Dollars & Sense
Manage your finances right.
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5385 ....$62.

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Conquer the world with your strategy.
Virgin Games
4428 ....$31.

Scrabble Deluxe
Enjoy a family favorite word game.
Virgin Games
4000 .....$31.

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Wheel and deal to fame and fortune.
Virgin Games
4001 $31.

SyQuest 44MB Cartridges
Great stocking stuffer. Great value!
SyQuest
2269.....$69.

Tristan Pinball
"Best Simulation 1991" – SPA finalist.
Amtex
5032 ....$39.

Tsunami
Fight ninjas, robots, & huge insects in Asia.
Spph! Software
5256 ....$29.

Mission Thunderbolt
Macworld's Game Hall of Fame 1992
Casady & Greene ○
4346 .... $36.

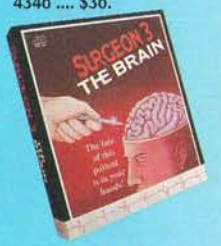
Mousestick II
5-button stick that works with any game!
Advanced Gravis ○
5079 .....$58.

Icon Gallery
More than 850 color icons.
Component Software
5519 ....$38.

Flight Simulator 4.0
Test your skills on a fleet of aircraft at 125 airports.
Microsoft ○
3532 .....$42.

MacKids Christmas Pack
Games, puzzles, and holiday cheer!
Nordic Software ○
3906 ....$31.

M-4 (w/headphones)
An authentic M4 Sherman tank simulation.
Deadly Games ○
5360 ....$35.



Surgeon 3, The Brain
An intense, realistic glimpse at brain surgery.
ISM
4326 .....$32.

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Easy to use 32-bit color.
TimeWorks, Inc.
5530.....$28.

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64 new rooms!
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5372 .....$20.

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Children learn math solving fun mazes.
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3306 ....$36.

Marvelous Mac Games
LeVitus's favorite shareware games.
Prima Publishing
5224 ....$18.

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Battle human opponents in real time.
Bungie Software ○
5007 .....$48.

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The Quicktel 14,400 bps send/receive fax with 14,400 bps data modem combines speed with the quality and styling that wins raves. It includes CCITT V.32bis, V.42bis, and MNP 5. Speed through large files at rates from 14,400 to 57,600 bps when connected to a Hayes compatible modem.

Logicode

4176 Quicktel V.32 Fax/Modem.....$328.

NetVANTAGE II

Plan your network right. NetVANTAGE II is the only software available that allows you to evaluate proposed network configurations by building an on-screen "virtual network" and then "running" that network. You'll see user-perceived performance times, network bottlenecks, under-utilized resources, and serious configuration errors before they happen.

Eclectec Software

5164 NetVANTAGE II .....$798.

BNC 4-Port Thin Ethernet Repeat

Hub your Macs on Thin Ethernet for half the cost of other repeaters. You'll save time when it comes to trouble shooting because each port has a signal light to show you where the problem lies. No more checking each connection on your backboned network.

Tutankhamon ○

5240 BNC 4-Port Thin Ethernet Repeat .....$448.

PowerBook RAM

Your actual memory requirements can easily be twice what the PowerBook provides. Newer Technology specializes in low power consumption PowerBook memory with a full line of RAM upgrade cards (even for the new PowerBooks) that are easy to install. Call for pricing on the complete line of Newer PowerBook memory for old and new PowerBooks.

Newer Technology

5310 PowerBook 140/170 Psuedo-Static 6MB .....CALL
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Universal PowerCache Card

When you feel the need for speed, the award-winning PowerCache gives you the best combination of blazing-fast speeds (up to three times faster) and cost-effective prices. More important, it's guaranteed 100% compatible with all your software and hardware while running at full speed.

DayStar Digital ○

Universal PowerCache Cards .....*See Listings.*

AsantéPrint

AsantéPrint is an inexpensive EtherTalk-to-LocalTalk converter. It connects two LocalTalk printers or other devices to a high-speed Ethernet network. Now users in mixed Ethernet and LocalTalk environments can inexpensively share resources. And with no switches or installation software to load, AsantéPrint is smart enough to work right out of the box.

Asanté Technologies

5478 AsantéPrint Thick/10T .....$358.

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- All products carry a 120-day limited warranty from Mac's Place.
- Defective software is replaced immediately with like items. Defective hardware items repaired or replaced at our discretion.
- Some hardware items carry one-, two-, or five-year warranties.
- Products with the ○ symbol carry a manufacturer's 30- or 60- day Money Back Guarantee.

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Service Hero

Phil Block of North Hollywood, California, nominates Raquel Romano from Nisus Software for sainthood. Seems she was fast and friendly in responding to Block's technical questions. What a concept!

Microsoft, like Apple, is a company people love to hate. But the monolithic enterprise has several things going for it, apart from good products. One saintly move was to deviate from its standard, expensive policy and allow Word 5.0 users to upgrade to 5.1 for a mere $14.95 plus shipping. Technical support is getting saintlier these days too, according to a user-group source. He claims Microsoft's support has measurably improved over the year.

Those good deeds haven't eradicated the devilish streak at Microsoft, however. The Windows version of Word, for example, leapfrogged over the Mac version several upgrades ago. Macintosh users are still missing several features that Windows users enjoy, including revision tracking, macros, and document comparison.

Now Software trespassed against its users by releasing Now Utilities 4.0 before its time. Earlier versions won kudos; 4.0 was too buggy to bear.

MacBottom hard drive owners have surely been sinned against by *PCPC*, Personal Computer Peripheral Corporation. Reader Sandy Lavin wins the worst-luck award. She sent in her drive for a warranty repair in November 1991. Nearly one year later, Lavin says she hasn't received her drive back, nor has she ever heard anything from the company, despite phone calls and letters. Only a few readers have written this year about the company's poor service, but the complaints tell similar tales of an unresponsive company.

Pinnacle's sin is the figures it uses in the advertising for its PMO-650 rewritable optical drive. According to the ad copy, the PMO-650 is "five times faster than Sony's SMO-E501 optical drive." Not so fast—*Macworld* tests showed Pinnacle's drive was the fastest. But it was only 27 percent faster than most of its competitors. A healthy margin, but not quite five times faster.

Owners of Sigma Design's Doubleup compression board were left in the lurch this year when *Salient Software* and *Stak Technology*, maker of the chip used by Sigma, were unable to negotiate a licensing agreement. Stak had previously shared its decompression algorithm with Salient Software, which added that code to DiskDoubler. The upshot was that users of both Doubleup and DiskDoubler could share compressed files with other DiskDoubler owners. But then Stak was awarded a patent on its code and wanted royalties from Salient, which found the demands excessive. Because the companies couldn't come to an agreement, DiskDoubler no longer works with the Doubleup board, and Doubleup board users can only share compressed files with other Doubleup board users.

Software Ventures bundled MicroPhone II 4.0 with an application to help users navigate CompuServe and other online systems. Only problem is, the application doesn't work yet. MicroPhone Pro users are similarly tormented.

TigerSoftware made itself less than saintly by including capsule reviews at the beginning of the product advertisements in its catalog. It's a great sales tool, but inexperienced customers may not realize that the "Reviewer's Notebook" section is part of the advertisement, not an objective overview.

Visionary Software's saintly act is to print product manuals on recycled paper and create each program so that demo versions can be easily distributed to friends.

A Blanket Thank-You

MY APOLOGIES TO THOSE WHOSE good policies or actions I've overlooked. And a warning to companies whose dark deeds have gone unpublicized—I may catch up with you next year!

In the meantime, I'd like to take this opportunity to award halos to all the mail-order companies, hardware vendors, and software publishers who have responded promptly to issues raised by our readers this year. Some companies ignore the complaints *Macworld* forwards to them, but many genuinely care about their customers and move swiftly to address customer misunderstandings or concerns. Please accept my blanket thank-you. And readers, send your nominations for both saints and sinners for next year. ■

Research assistance by CAROLYN BICKFORD.

Send nominees for sainthood to Service Heroes, *Macworld*, 501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld1) or America Online (Branscum). Conversely, drop *Conspicuous Consumer* a line if a company is ignoring you.

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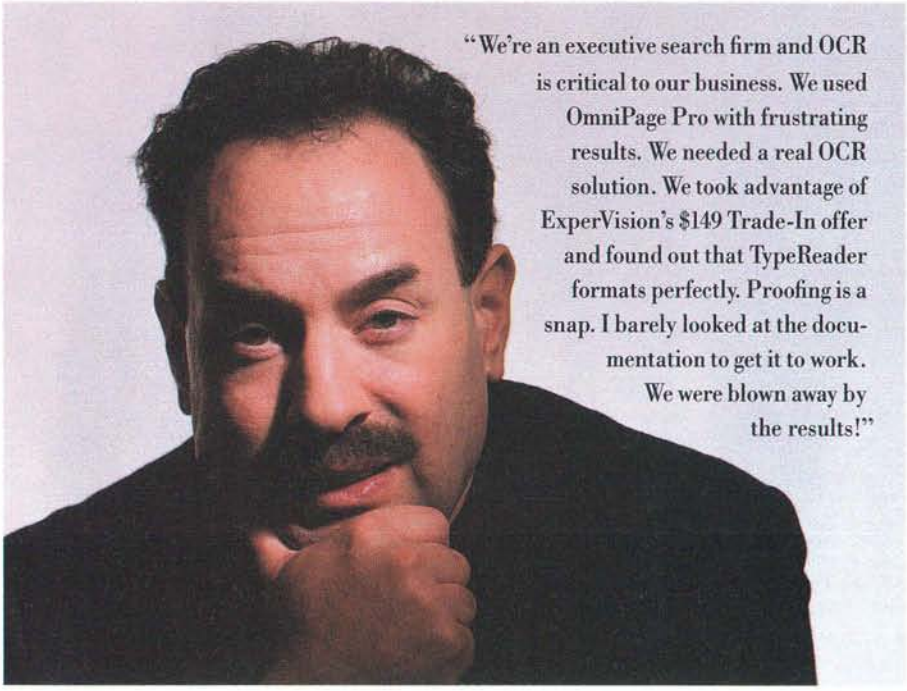
Circle 178 on reader service card



STEVE BRODY, PRESIDENT—BRODY & ASSOCIATES

FINANCIAL REPORT

Domestic Operations

Volume 3, Issue 2

Projections indicate strong economic growth

Interest rates may continue to fall, but there's growing belief in the bond market that it may not go as much longer.

Many money managers are looking for another cut in short-term rates after the next meeting of the Federal Open Market Committee, the policy-making arm of the Federal Reserve.

With confusion in the European currency markets, the additional entry into the American presidential race, and fears about possible attempts to stimulate the economy with tax cuts and increased government spending, few experts expect any substantial decline in rates, at least through the end of the year.

A number of financial experts believe that the political uncertainties could push rates up, while the economic realities will hold rates down. Any major drop in bond yields won't happen for the next few months. The range may be 7.125% to 7.5% for the 30-year bond.

Like a growing number of other money managers, the bond market rally may not be as so doubtful, but it is showing signs of decline.

Many bond investors believe that the Fed has little operating room for further rate cuts. One more cut is likely, they say, before the presidential election and perhaps sooner. But after that, there will be very little left to cut, especially if certain European countries continue to keep their interest rates stubbornly high.

Lower interest rates predicted

Fewer viable bargains are being found in closed-end funds based on recent evaluations.

Bargains among closed-end funds have become even more scarce over the past three months, as fund stock prices moved higher relative to their underlying per share portfolio value. Closed-end funds have a fixed number of shares outstanding, which trade on the stock exchange. A fund's shares can sell above or below the value of the fund's underlying portfolio value. A fund that sells shares to portfolio value is said to be at a "premium," while one selling below is at a *discount*.

In the third quarter of this year, the average discount among domestic closed-end stock funds narrowed by 1.0 percentage points to a discount of 1.7%. Through Sept. 27, the average domestic closed-end stock fund gained 2.8% in the third quarter, roughly in line with the stock market.

Leveraged municipal bond funds had an average total return of 3.5% in the quarter through November, compared with 3.1% for unleveraged muni bonds. Leveraged mutual bonds sold at an average premium of 2.7%, while unleveraged funds came in at a lower percent of 1.8%.

Leading Indicators by Region

Region	Total	Change	Expected
Northeast	250.5	+6.25%	+2.62%
West	232.0	+3.48	+2.50
South	186.8	-2.39	-2.25
Northwest	145.5	-3.74	-2.75
Southeast	190.6	-3.39	-2.85

Economic picture a mix of ups and downs

The current U.S. economy, like a bear on a cold day, is bewildered. As a result, there's no clear movement in the economy one way or the other.

With a month to go before the presidential election, the most recent indicators point to stagnation in the overall U.S. economy and a contraction in the manufacturing sector. U.S. employers gained 57,000 jobs last month after creating 128,000 the month before, according to the Labor Department. Even discounting the loss of 97,000 jobs resulting from the end of the federal summer jobs program, employments gains only 40,000 last month to 108.4 million. The unemployment rate fell slightly to 7.5% of the work force from 7.6% in August, but analysts didn't see that as a positive sign.

Meanwhile, in the hard-hit manufacturing sign from the nation's manufacturing facilities, the Commerce Department said Friday that new orders for factory goods fell 1.9% in August, the third decline in the past four months.

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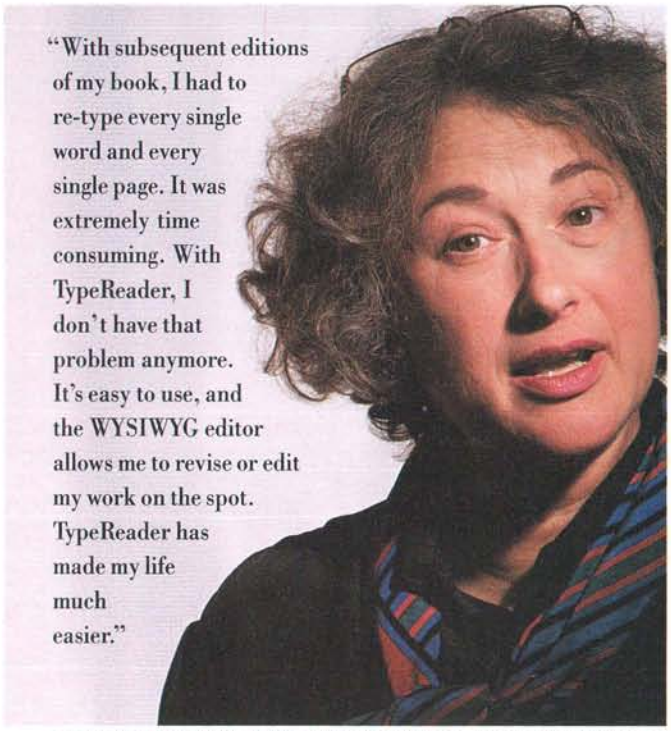
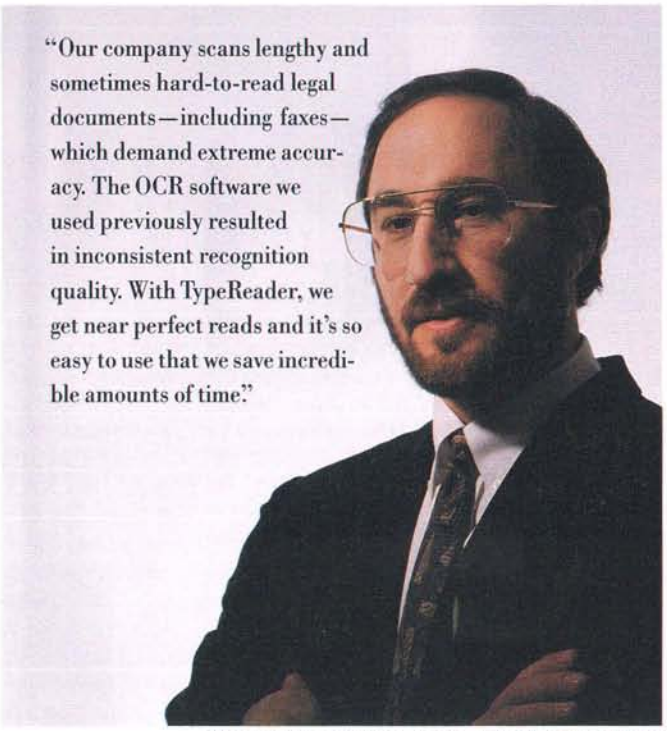


E. BARBARA PHILLIPS, PROFESSOR AND AUTHOR—BERKELEY, CALIFORNIA



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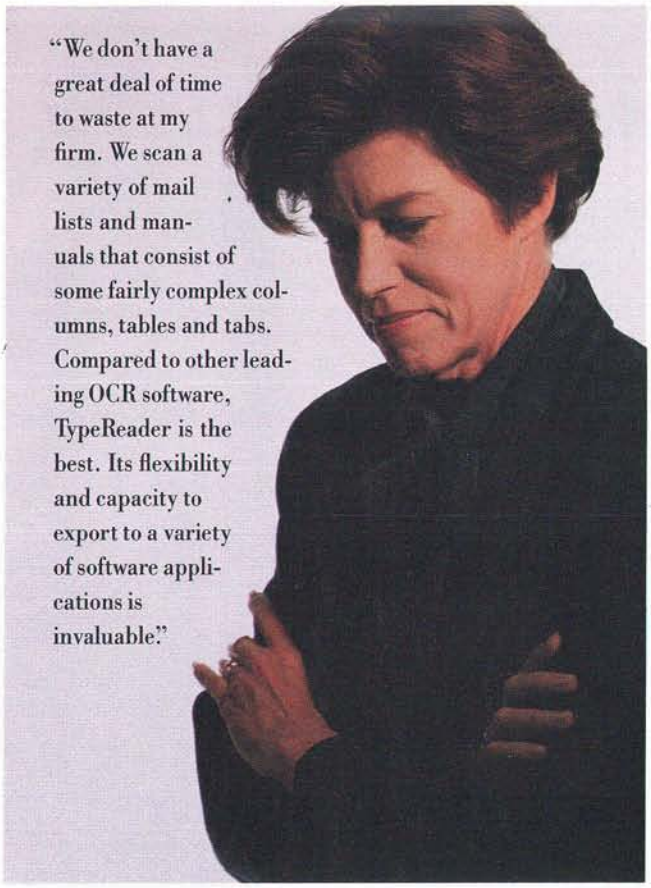
Their words speak for themselves, so we won't burden you with a lot of sales hype. We'll simply tell you that by acting now, you'll pay only $149 for TypeReader with proof of ownership of another OCR software product.† If you're not a current OCR software user, you'll get a $100 rebate when you purchase TypeReader.

You can't afford not to compare TypeReader.



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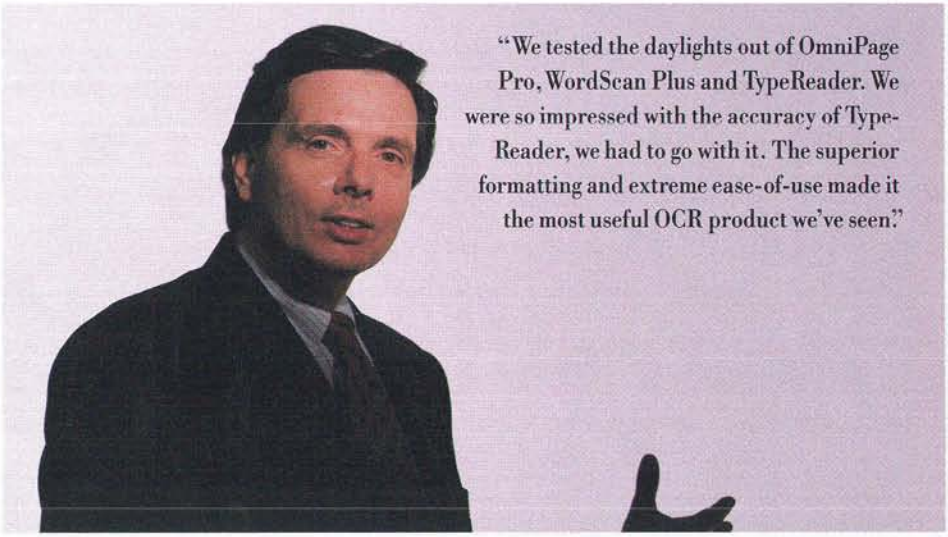

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EXPERVISION

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Circle 170 on reader service card

Every 3.5 seconds, there's another use for the LabelWriter II.

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These tiny marvels connect to your Macintosh® with ease and use thermal printing technology to produce laser sharp labels in just 3.5 seconds.

There are two LabelWriter II models. The standard LabelWriter II prints on white, yellow or clear 1⅛" x 3½" labels. The LabelWriter II Plus also handles 2¼" x 4", 3.5" disk, and video cassette labels.

Both come with a Desk Accessory that lets you create, format and print a label at any time, without interrupting your main programs. You can combine text with clip art and graphics. Or manage mailing lists, print postal bar codes, bar code 39, and serialized labels. There's even a chooser driver so you can print directly from your favorite programs.

The LabelWriter II printers are compatible with System 7, ATM® and TrueType.® An AppleTalk® interface is also available.

For more information please call **1-800-4-COSTAR, ext. 184.** Outside the U.S. call 203-661-9700. Or fax 203-661-1540.

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Circle 196 on reader service card

Updates

JANUARY 1993

THIS SECTION LISTS THE LATEST VERSIONS OF SELECTED MAC APPLICATIONS THAT WERE SHIPPING BY THE TIME WE WENT TO PRESS.

PRODUCT	V.	REQ.	★	$
4TH DIMENSION	2.2	1MB/6.0		$99
A4	3.1	2MB/6.0.5		$385
ACCESSPC	2.0	1MB/6.0		$24.95
ACCOUNTANT, INC. PROFESSIONAL	3.0	1MB/6.0.3		*
ACCUTEXT	3.0	4MB/6.0		$150
ACTA 7	7.0	512KE/6.0.5	2/92	$33.50
ADDMOTION	2.0	2MB/6.0.5		*
ADDRESS BOOK PLUS	2.0	1MB/6.0.2	2/92	$25
ADOBE ILLUSTRATOR	3.2	2MB/6.0.3		*
ADOBE PHOTOSHOP	2.0.1	2MB/6.0.2		$199
ADOBE PREMIERE	2.0.	4MB/6.0.7	1/93	$149
ADOBE TYPE MANAGER	2.0.3	1MB/6.0.2		FREE
AFTER DARK	2.0v	512KE/4.1		*
AGENT DA	2.0	1MB/6.0.5	9/92	$30
AGFATYPE	3.1	2MB/6.0.2		FREE
ALARMING EVENTS	1.1	1MB/6.0.2		$20
ALDUS DIGITAL DARKROOM	2.0	1MB/6.0		*
ALDUS FREEHAND	3.1	1MB/6.0.5	6/92	*
ALDUS PAGEMAKER	4.2	4MB/6.0.5	5/92	*
ALDUS PERSUASION	2.1	4MB/6.0.5		*
ALDUS SUPERCARD	1.6	2MB/6.0.4		$50
ALDUS SUPERPAINT	3.0	1MB/6.0.5	3/92	$65
ALIAS SKETCH	1.5	8MB/6.0.5	8/92	$25
ALISAMAIL	4.02	1MB/6.0		*
ALLIANCE POWER TOOLS	2.68	1MB/6.0.5		*
AMAZING PAINT	1.0.3	512KE/6.0.4		$15
AME	2.03	1MB/6.0.2		$49.95
ANTITOXIN	2.0	1MB/6.0		$15
APPLESHARE FILE SERVER	3.0	512K/3.2		*
ARCHICAD	4.1	5MB/6.0	6/92	10% OF LIST
ASHLAR VELLUM	2.10	4MB/6.0.2		*
ASHLAR VELLUM 3D	2.10	4MB/6.0.2		*
AUTHORWARE PRO	1.7	2MB/6.0.5		*
AUTOCAD	12	5MB/6.0.5	12/92	$500
AUTODOUBLER	2.0	1MB/6.0.4	9/92	*
AUTOSAVE II	2.0	512KE/4.2		*
A/UX	3.0	4MB/6.0.5	11/92	*
AZIMUTH	2.1	1MB/6.0.2		$45
BACKMATIC	2.0	1MB/4.2	2/92	*
BEAGLEWORKS	1.0.1	1MB/6.0.5		FREE
BILL-IT	4.0	1MB/6.0.3		$29
BUSINESS SENSE	1.6	1MB/6.0.7		$69
CA-CRICKET PRESENTS	2.0.1	1MB/6.0		*
CALENDAR	1.1.2	512KE/6.0		FREE
CANOPENER	2.0	512K/3.0		$29
CANVAS	3.0	1MB/6.0.2		*
CAPTURE	4.0	1MB/6.0		$30
CARBON COPY MAC	2.0	1MB/6.0.5	4/92	*
CAT III	1.2	1MB/6.0		*
CAUSE	2.12	1MB/6.0		*
CC:MAIL FOR MACINTOSH	2.0	1MB/6.0.4		$25
CHECKLIST	2.0	1MB/6.0	2/92	*
CHECKMARK PAYROLL	4.6	512K/4.2		$50
CINEMATION	1.0	4MB/6.07	7/92	NA
CLARIS CAD	2.0v3	2MB/6.0		$79
CLARIS RESOLVE	1.1	1MB/6.0.5		$20
CLARISWORKS	1.0	1MB/6.0.5	3/92	NA
CLICKCHANGE	1.05.2	1MB/6.0.4		$5
CLICKPASTE	2.1	1MB/6.0		$20
CMS UTILITIES	7.0	2MB/7.0		$25
COLORSTUDIO	1.5	4MB/6.0.5	3/92	*
COMPACT PRO	1.33	1MB/4.2		FREE
COMPUSERVE INFORMATION MANAGER	1.5.1	1MB/4.1	12/92	*
COMPUSERVE NAVIGATOR	3.1	512K/4.1		*
CONCERTWARE+	4.0	512KE/4.2		$15
CONNECTIONS	2.1	2MB/6.0.5	11/92	FREE
CONTROL CLASSIC	1.5	4MB/6.0.5		*
CORRECT GRAMMAR	3.0	1MB/4.2	8/92	$29.95
DATACLUB CLASSIC	2.0	2MB/6.0	8/92	*
DATA SHAPER	1.2	1MB/6.0		$40
DECK	1.03	2MB/6.0.7		FREE
DELTAGRAPH PROFESSIONAL	2.0	2MB/6.0.5	5/92	$69.95
DESCARTES	1.04	2MB/6.0.3		FREE
D.E.S. DOCUMENT EXCHANGE SYSTEM	4.1	1MB/6.0		*
DESIGNCAD	3.0	2MB/6.0.5		*
DESIGNCAD 2D/3D	3.0	2MB/6.0.5	11/92	$50
DESIGNSTUDIO	2.0	1MB/6.0		*
DESK	3.08	1MB/6.0.5		$24.95
DESKPAINT	3.07	1MB/6.0.5		$19.95
DIGIMATIC	2.0	1MB/6.0.5		$89
DIGITAL DARKROOM	2.0	1MB/6.0.4		$80

continues

V. = version #. **Req.** = min. RAM and system software required. ★ = last time (in the past year) this or an earlier version was reviewed. **$** = cost of update to registered owners. **NA** = first version, not applicable. * = contact your dealer for update policy. **Blue** = new version. **Yellow** = reviewed product.

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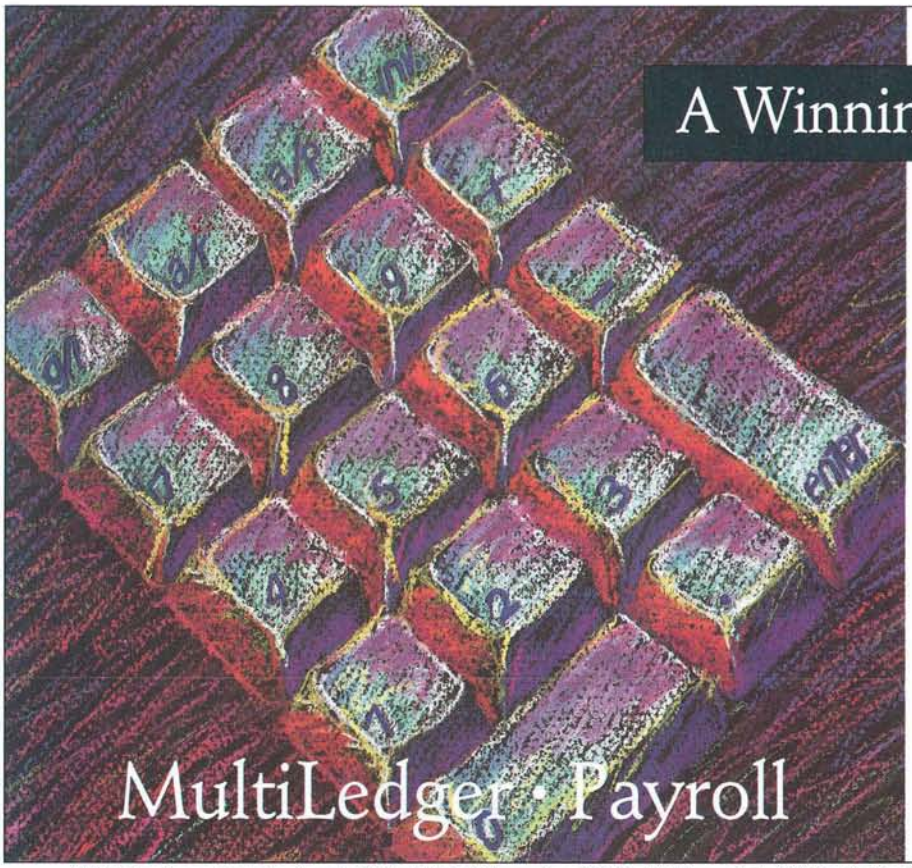
PRODUCT	V.	REQ.	★	$
DISKDOUBLER	3.7	1MB/6.0.2		$15
DISKEXPRESS II	2.11	1MB/6.0		FREE
DISKFIT PRO	1.1	1MB/6.0	4/92	*
DISKTOP	4.0.2	1MB/6.0		*
DISPLAY ADBUILDER	1.1	1MB/6.0.3		*
DOCUCOMP II		1MB/6.0	11/92	$29.95
DOLLARS & SENSE	5.0	512KE/3.2		*
DOUBLE HELIX	3.5	1MB/6.0		$99
DREAMS	1.1	1MB/6.0.2		*
DRIVE 7	2.3	1MB/6.0.5	1/93	*
DYNAPERSPECTIVE	2.3	2MB/6.0.5		$149
DYNODEX	2.0	1MB/6.0	2/92	$25
EASY COLOR PAINT	3.0	1MB/6.0.5		*
EHELP	2.0	1MB/4.1		$445
EMPOWER II	4.0.7	2MB/4.2		*
ENCORE	2.5	2MB/6.0.2		*
ENHANCE	2.0	2MB/6.0.3		$100
EVOLVE	1.1	2MB/5.3		$25
EXODUS	4.0	2MB/6.0.3		$75
EXPRESSIONIST	3.0	1MB/6.0.2		$49.95
EZ VISION	1.0	1MB/6.0.3		NA
FAIR WITNESS	1.2	1MB/6.0.2	10/92	FREE
FASTBACK PLUS MAC	3.0	1MB/6.0	4/92	$30
FAST FORMS	2.0	1MB/6.0		$25
FASTLABEL	3.1	1MB/6.0		$10
FASTTRACK SCHEDULE	2.0	1MB/6.0		$89
FILEGUARD	2.7	1MB/4.2		$18
FILEMAKER PRO	2.0	1MB/6.0	1/93	$89
FILEVISION V	1.1	1MB/6.0.2		*
FINALE	2.6	1MB/6.0.2		FREE
FIRST THINGS FIRST	3.0	1MB/6.0.4	4/92	$19.95

PRODUCT	V.	REQ.	★	$
FONTMONGER	1.0.5	2MB/6.0.2		FREE
FONTOGRAPHER	3.5	1MB/4.2	11/92	*
FONTSTUDIO	2.0	1MB/6.0.5		*
FOXBASE+/MAC	2.01	1MB/6.0		FREE
FRAMEMAKER	3.0	1MB/6.0	3/92	*
FREEDOM OF PRESS LIGHT	3.0.3	2MB/6.0.3		$25
FREEDOM OF PRESS PROFESSIONAL	3.0.2A	4MB/6.0.3		$250
FULL IMPACT	2.0	1MB/6.0		$50
FULLWRITE PROFESSIONAL	1.5	2MB/6.0.2		*
GENERIC CADD	2.0	2MB/6.0.5		$100
GEOQUERY	3.02	1MB/6.0	11/92	*
GOFER	2.0	1MB/4.1	6/92	$25
GQL	3.0	2MB/5.0		$75
GRACELAN	2.0	1MB/6.0.5		*
GRACELAN UPDATE MANAGER	1.1	2MB/6.0.5		FREE
GRADE MACHINE	5.0	1MB/6.0.5	12/92	50% OF LIST
GRAMMATIK MAC	2.05	1MB/6.0		$15
GREAT GANTT	1.4	1MB/6.0		*
GREAT PLAINS ACCOUNTING SERIES	6.0	1MB/4.2		*
GREATWORKS	1.0	1MB/6.0.2		NA
GUIDE	2.0	512K/4.1		$50
HAND-OFF II	2.2.5	2MB/6.0.2		FREE
HELP	1.0.3	1MB/6.0	2/92	FREE
HYPERCARD	2.1	1MB/6.0.3		$49
HYPERDA	2.1	1MB/6.0		$29
ICON-IT	2.1	1MB/6.0.2		*
IF:X FORMS DESIGNER	1.1	1MB/6.0		FREE
IGOR	1.2	2MB/4.2		$35
IMAGE GRABBER	3.0	1MB/6.0	2/92	$18

PRODUCT	V.	REQ.	★	$
IMAGESTUDIO	1.7	1MB/6.0		$99
INFINI-D	2.0	4MB/6.0.4	1/93	*
INSIDE OUT	II	1MB/6.0.2		*
INSPIRATION	3.0.1	1MB/4.2		*
INSTANT-EXPERT PLUS	2.0	1MB/5.0		FREE
INTOUCH	2.0	1MB/6.0.5	3/92	$24.95
KIWIENVELOPES	3.1	512KE/4.1		*
LABVIEW	2.2	4MB/6.0.5		*
LANGUAGE SYSTEMS FORTRAN	3.0	2MB/6.0.4		$100
LAPLINK MAC III	3.2	512K/2.0		FREE
LAPLINK MAC PLUS III	3.0	512K/2.0		*
LASERPAINT COLOR II	1.02	1MB/6.0.3		FREE
LETRASTUDIO	2.0	2MB/6.0	10/92	*
LISTEN	2.1.3	2MB/6.0.2		$35
MACANALYST	3.1	2MB/6.0		*
MACARCHITRION	5.5	2MB/6.0.3		*
MACBRAIN	3.0	1MB/6.0.5		$295
MACDRAFT	2.1	1MB/6.0.2		*
MACDRAW II	1.1	1MB/6.0		*
MACDRAW PRO	1.5	2MB/6.0.5		*
MACENVELOPE	5.1	1MB/4.2		$29.95
MACENVELOPE PLUS	2.0	512KE/3.2		$50
MACFLOW	3.7	1MB/6.0		$30
MACFORTRAN II	3.1	4MB/6.0.3		$99
MACGLOBE	1.0	1MB/6.0.4	4/92	*
MACLABELPRO	1.5	1MB/6.0.3		$19.95
MACLINKPLUS/PC	6.0	1MB/6.0.3	3/92	*
MACMONEY	3.5	512KE/4.0		$12
MACPAINT	2.0	512KE/3.2		$25
MACPALETTE II	2.2	1MB/6.0.5	9/92	*
MACPHONEBOOK	3.0	1MB/6.0		*



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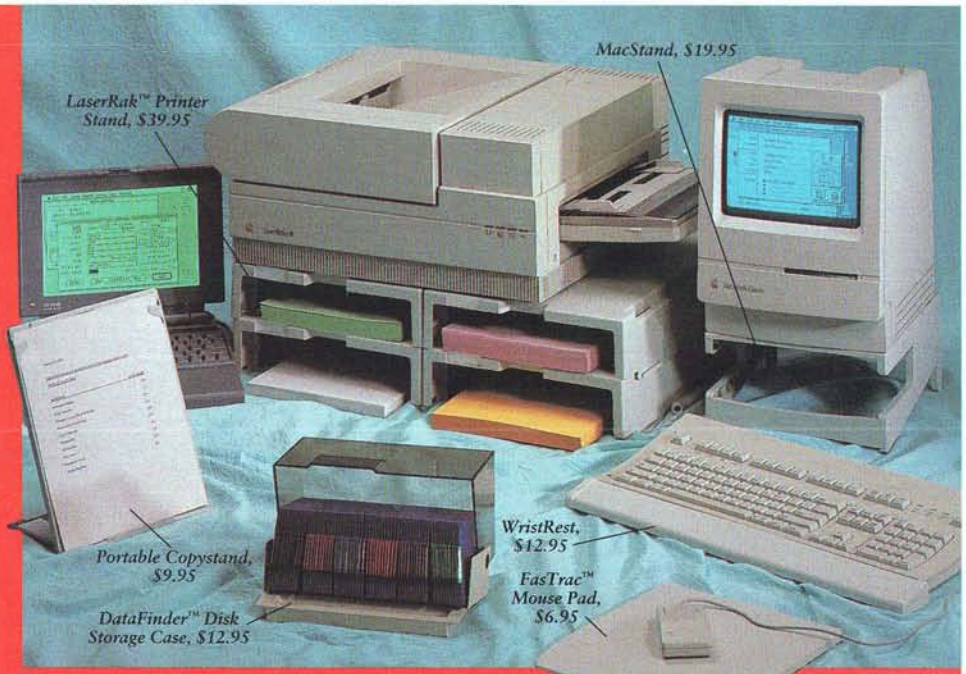

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Publisher: After Hours Software
BND0144

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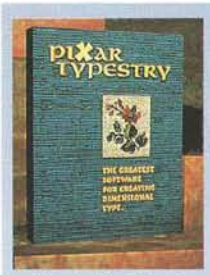


Typestry 1.0

❼Pixar Typestry is exciting software which creates dimensional text from Type 1 and TrueType fonts. Users can move, rotate, scale and extrude words or individual letters and decorate their fonts in any number of interesting appearances. Ideal for creating images for logos, publishing, design, presentation graphics or multimedia. Typestry let's users work in a familiar 2-D environment but gives them amazing 3-D results. Typestry invokes RenderMan magic to transform a simple word into an extraordinary picture.
Publisher: Pixar
FON0482

$189

PowerMerge

❼File Synchronization for the Mac. If you use more than one Mac, PowerMerge gives you a simple and automatic way to keep track of the latest version of your files. PowerMerge will synchronize files between a PowerBook and a desktop Mac, two desktop Macs, a removable hard disk and Mac or any two Macs via network or removable media. An unlimited number of files, folders, and disks can be selected and automatically maintained. Advanced features include: Conflict Notification if files have changed on both Macs since updating, a History Log that reviews which files were updated, and Include/Exclude so the user can control the process.
Publisher: Leader Technologies UTI0312

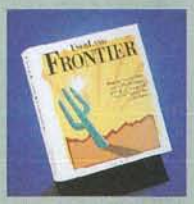
$85

RunPC/Network

❼Connect any one of 10 Macs to a PC via modem or AppleTalk network to control virtually any DOS program. Run programs at full speed, access VGA graphics, extended/expanded memory and PC peripherals. Copy and paste text or graphics between programs, print DOS files onto your Mac printer. Transfer files, translate documents in either direction and mount DOS disks using included Software Bridge/Mac. **Publisher: Argosy Software, Inc.**
RunPC/Remote: connect a single Mac to a PC via modem or included serial cable. **COM0103 $139**
RunPC/Network
COM0098

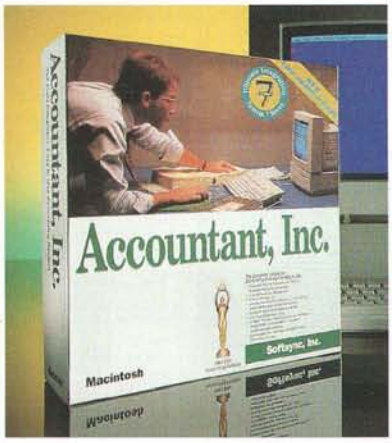
$279

UserLand Frontier



❼With UserLand Frontier, you don't have to choose between pretty icons and the power to customize and automate your Macintosh. For the first time, you can have power and ease-of-use. Frontier has all the development tools you need to get your scripts running quickly, including a full script debugger and structured symbol tables you can watch and edit while your scripts are running. When you're done, you can link scripts into Frontier's editable menu bar, or save them to the Finder desktop.
Publisher: UserLand
UTI0272

$189



Accountant, Inc. 3.01

❼"BEST ACCOUNTING PACKAGE" 1991 MacUser's Editors' Choice Award. More Features, more Power, more Flexibility. It's easy to use and gives you exceptional streamlining power. Every transaction is automatically posted to your General Ledger. Accountant, Inc.'s new revolutionary System 7 design gives you the advantage of customizing your forms, screens and reports by hot linking with your favorite forms design, spreadsheet and database programs. You get Invoicing, Accounts Receivable, Inventory, Accounts payable, Check Writing, integrated General Ledger and Payroll. Accountant, Inc. is now available in single and multiuser versions.
Publisher: Softsync, Inc. FIN0048

$335

ScanMaker II and ScanMaker II XE*

❼The new Microtek ScanMaker series provides a simple and affordable way to bring color and black-and-white images into your computer at resolutions up to 1200 dpi, and scans color photographs or artwork in full 24 bit color or 256 shades of gray. The ScanMaker II is bundled with Adobe PhotoShop LE. The ScanMaker II XE is great for scanning color or black-and-white images and is bundeled with a full version of Adobe's PhotoShop, the premier image processing software for the Macintosh.
Manufacturer: Microtek
II XE INP0247
II INP0246 $929

$1239*

StuffIt Deluxe 3.0 or StuffIt SpaceSaver*

❼**StuffIt Deluxe 3.0** is the"Complete Compression solution". Only StuffIt Deluxe 3.0 can solve all your compression needs from archiving to transparent compression and includes StuffIt SpaceSaver. StuffIt Deluxe 3.0 is the fastest most efficient compression product available. Our new Add Match intelligently stuffs only the files that met the criteria that you specify.
UTI0302 $69

❼**StuffIt SpaceSaver** is unlike other compression products, it increases disk space (with lightning speed) without effort on your part. Have it work while your Mac is idle or when you say "Compress this for me." SpaceSaver provides complete on-the-fly compression in one package. SpaceSaver is also one of the least expensive, most productive and easiest to use compression products available.
Publisher:
Aladdin Systems, Inc.
UTI0303

$35*

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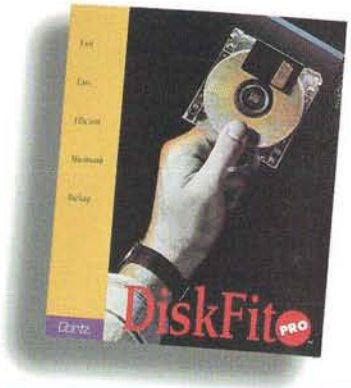
You can now contact MacWAREHOUSE or place orders with us in the **Electronic Mall** on Compuserve. The **MacWAREHOUSE GO code** is **GO MW**. As always, you'll get fast, dependable overnight service and you can leave messages for Kerry or any of our support staff.



DiskFit Pro

For Finder-readable backup to floppies, cartridge or other hard disks, get DiskFit Pro. DiskFit Pro copies files from your hard disk and creates a "SmartSet". With each subsequent backup, the "SmartSet" is updated and obsolete files are replaced, so backups are fast and backup sets stay compact. Files are stored in Finder format so a click and drag is all it takes to restore data. A backup reminder helps form the backup habit and a calendar allows the scheduling of automatic, unattended backups to a hard drive or a folder on the server. System 6 compatible. System 7 savvy.
Publisher: Dantz Development
UTI0246

$74

Fractal Design Painter®, or Fractal Design Sketcher™ *

Painter introduced the computer world to natural-media effects, duplicating traditional tools and textures in true 24-bit color. Now Sketcher brings these image-editing tools to grayscale. Painter and Sketcher include dozens of brushes, pen, chalks and even paper grains. Create artwork from scratch or convert scanned images into works of art with the "cloning" feature. Painter is perfect for designers, fine artists, graphic artists and students. Sketcher is ideal for designers and artists working in grayscale, for desktop publishers and word processors placing graphics in their files, and for designers using black-and-white photos and artwork.
Publisher: Fractal Design Corp.
Fractal Design Painter
GRA0323 $249
Fractal Design Sketcher
GRA0393

$99

DeltaGraph Professional

DeltaGraph Professional is an easy-to-use, yet comprehensive charting and graphing solution, providing over 250 different chart types as well as full slide show capabilities. DeltaGraph Professional covers the full spectrum of business and scientific charting and graphing needs. The product features complete formatting control, extensive data importing and pre-formatted chart template and clipart libraries. Special Offer!-get a Texas Instruments 68 scientific calculator FREE! ($60.value) included in the box. *While Supples Last.*
Publisher: DeltaPoint
BUS0187

$199

InTouch 2.0

InTouch 1.1 was rated "the best name-and-address DA for the Mac," *MacUser* Magazine, 4/91 (4.5 Mice rating). New InTouch 2.0 is even better! Version 2.0 adds an integrated reminder program, sorting, list view, phone books, fax cover sheets and much more. InTouch stores unlimited names, addresses, phone numbers and notes. The reminder program will notify you about that important meeting or phone call - it will even find the contact's number and dial it automatically. Sort your contacts into groups for easy printing of address books, mailing labels or envelopes. Share contacts with the lightning fast InTouch network.
Publisher: Advanced Software
Also available: *DocuCompII* DTP0081 $99. and *InTouch 2.0 Network-3Pack* UTI0307 $139.

InTouch 2.0
UTI0291

$59

FileGuard

"It's about as much software-based security as you can get in one package." MacUser, March 1992. Protect your hard drive from unauthorized access (including security bypass with a system diskette), copying and erasure; applications and file/folders (including System folder) from unauthorized access, deletion, and/or illegal copying. Protect your desktop from alterations by unauthorized users. Keep an eye on System usage with FileGuard's Log which continuously tracks user/group activity. System 7.0 Compatible.
Publisher: ASD Software

Single
UTI0135

$139

Super 7 Utilities

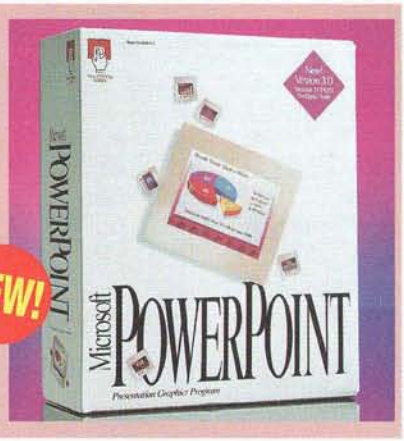
Included are: Mighty Menus to give you the ability to tear menus from the menu bar of any application; Printer Picker lets you quickly select a network printer without visiting the Chooser; Desktop Extras to make filing files at the finder faster; Super Comments which preserves the Finder "Get info" comments during desktop rebuild, and lets you edit or view them in any application; Trash Alias which prevents orphaned aliases; Helium Pro makes Balloon Help practical and Speed Beep Pro lets you customize your Mac's warning sounds.
Publisher: Atticus UTI0306

$65

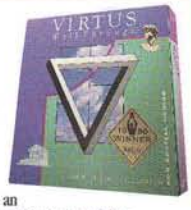
PowerPoint 3.0

PowerPoint 3.0, makes it easy for presenters to have complete control over their presentations, from initial ideas through powerful end results. It has all the tools you need: word processing, graphing, outlining, drawing and presentation management. And it is designed to take full advantage of the capabilities of QuickTime and System 7.0, including Publish and Subscribe, AppleEvents, and Balloon Help. That's because the PowerPoint presentation graphics program was designed especially for business people like you who need to communicate important ideas. With PowerPoint, you have the power and the flexibility to create presentations that are as strong as your ideas.
Publisher: Microsoft BUS0269

$335



Virtus WalkThrough 1.11



The latest version of this award winning 3-D drawing program provides everything you need to quickly capture and explore your ideas in 3-D. Multiple windows and extensive drawing aids provide an interactive environment for editing and viewing your ideas. Interactive 3-D presentations, QuickTime® and PICS animated movies and perspective pictures dazzle your audiences. Enhanced Imports of 3-D DXF, PICT, Claris®CAD and MacDraw; and Exports of 3-D DXF, 2-D DXF, Claris®CAD, MacDraw, PICT and EPS. Winner of MacUser Breakthrough Product of the Year Award 1990.
Publisher:
Virtus Corporation
GRA0278

$309

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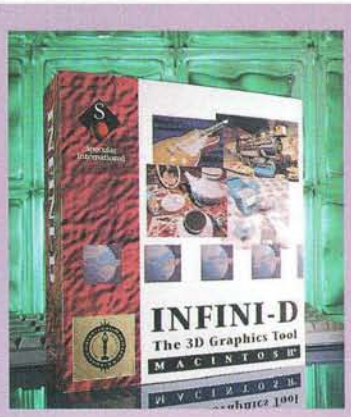
ACCUZIP6 1.0

❼AccuZip6 reduces your mailing costs in every possible way. It corrects, parses, and standardizes every address in your database. Then, it adds Carrier Route Zip+4 and a Postnet BarCode. It uses the database on the included CD-ROM to check addresses for accuracy, so mail intended for NJ won't end up in NH. AccuZip6 also performs presorts for First, Second, and Third class mail, produces all the applicable postal forms, and even prints sack labels.

Publisher: Software Publishers
BUS0235

$639

Infini-D 2.0



❼ Create dazzling images with the power of Infini-D's Three-dimensional environment. The easy-to-use Infini-D, now in an awesome second generation! Infini-D 1.0 was the package that brought 3D graphics to the rest of us. Infini-D 2.0 combines this friendly interface with sizzling 3D power: Infini-D's incredible new shader and raytracer now can render scenes up to 500% faster! Instant conversion of EPS files into 3D objects, Infini-D's awesome metamorphosis capabilities, precise PICT mapping control, and extensive QuickTime support make Infini-D 2.0 the 3D package of choice for graphic arts and multimedia professionals.

Publisher: Specular International GRA0303

$645

MacPrint 1.3

❼ Use a Macintosh with non-Apple printers. Print Mac applications on HP Laserjet, Deskjet or compatible printers including all Series IIs, IIIs and the Deskjet 500. Prints text and graphics at the printer's maximum resolution. Does not require PostScript. Cable is included.

Publisher: Insight Development
UTI0098

$95

Help! 1.03

❼It's the only Macintosh application which uses artificial intelligence to check your system for problems. With Help! you can clean up your configuration and improve your Macintosh's efficiency. Help! analyzes your Macintosh and creates an easily understood report that describes all problems and tells exactly how to solve them. Help! detects conflicts, incompatibilities, improperly installed files, environmental problems, damaged files, and duplicate files. Includes a simulation feature which allows you to check in advance for problems.

Publisher: Teknosys
UTI0251

$89

PacerTerm

❼PacerTerm was designed with your network in mind with multiple TTY, VT102 or VT320 emulation windows, connecting over your choice of serial lines, modems, networks and protocols including LAT, and TCP/IP. Once connected, PacerTerm lets you transfer files using ZMODEM, XMODEM, FTP, and Kermit. Powerful HyperTalk scripting with a full function script editor, plus programmable SoftKeys, lets you build flexible, friendly front ends to your host applications. Apple calls it, "Macintosh networking at its best!"

Publisher: Pacer Software
COM0106

$159

DayStar Universal PowerCache

❼Work up to three times faster with the best combination of blazing speed and low cost. Its Universal PDS design supports 14 Macs and leaves NuBus slots empty. It's guaranteed 100% compatible running at full speed and doesn't require additional memory. Rated as the best accelerator by leading industry editors, the PowerCache is always upgradable to any future DayStar products. Choose the board you need to get the speed you want.

Manufacturer: DayStar Digital
DRI0467 ***Universal Powercache 40 w/o 68882***
Full line available.

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White Knight V.11

❼Winner of 11 awards, White Knight will give you powerful, painless communications at an affordable price. Geared to all levels of experience, it supports file transfer protocols like ZMODEM, 3 styles of YMODEM, Flash & 3 styles of Kermit. Terminal emulation supports TTY, VT52, VT100 & VT102 as well as 32 bit color QuickDraw & large monitors. Comes with a FREE copy of Okyto (a revolutionary, new Mac-to-Mac file transfer program & $39.95 value).

Publisher: FreeSoft COM0060

$85

COPYright

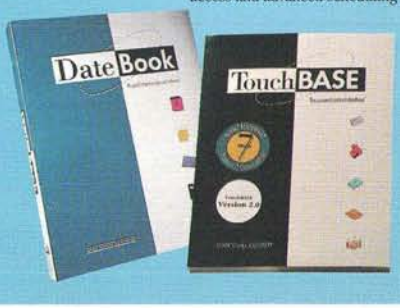
❼COPYright is a transparent utility that completely replaces the Finder's copy function, enabling users to copy files and folders in the background, and still perform all Finder functions (launch applications, delete files, etc.). It also means copy protection of a different kind by keeping a log of all copies to and from a Macintosh and is the first file copying utility that helps you track all copying traffic.

Publisher: CSG Technologies
UTI0320

$35

TouchBASE/DateBook Bundle-with Redux FREE!

❼Schedule, organize and save with the TouchBASE/DateBook Bundle. TouchBASE lets you to store information about personal and business contacts, alternative phone numbers, plus customize the fields. Also allows you to prints envelopes and mailing labels, including postal barcodes, and fax sheets covers. DateBook is the ultimate personal time manager for Macintosh. Instant access and advanced scheduling keeps you on top of your appointments and things to do. Shows your schedule in multiple formats including test, Gantt chart and time bar. DateBook's views enable you to see your schedule quickly in as much detail as you like. ***TouchBASE/DateBook bundle comes with FREE Redux, a quick and easy backup utility!***



Publisher: After Hours Software
BND0150

$99

POWER USER SIMMS ONLY $49*

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FREE! STEP-BY- STEP VIDEO INSTRUCTIONS**

A Power User Memory Expansion Kit will dramatically increase the power of your Mac. And our fast, reliable overnight service will have your Kit in your hands tomorrow!

MORE BRAIN POWER FOR YOUR MAC

Never again will you have to quit your word processor just to answer a question about a spreadsheet. Install extra memory and you can leave a letter open while you refer to last month's sales figures.

You can edit those monstrous scanner files with advanced graphics applications or develop your own custom HyperCard stacks. More memory means more power at your fingertips.

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Adding memory doesn't require technicians in lab coats. You'll find installation at home easy when you follow our FREE** step-by-step installation video instructions. Just open your Mac, slide out the main circuit board and plug in your SIMMs.

WHAT DO I NEED?

Our helpful sales and technical staff is standing by to answer any questions and take the mystery out of memory upgrades. Memory cards come with one megabyte on each card and are usually sold in pairs — (2 @ $49 ea.)

The chart explains exactly what you need to achieve the desired level of performance.

To open your Mac Plus, SE, and Classics you'll need a specially designed tool — it's available from us as part of a handy tool kit for just $9.

WHAT YOU NEED TO KNOW

Memory chips come factory-installed on plug-in cards, called SIMMs (Single Inline Memory Modules). Each one megabyte SIMMs card holds eight top quality, memory chips. We carry chips by all the major manufacturers like Texas Instruments, Intel and Samsung.

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4 MB	Replace all four 256k SIMMs with four 1 MB SIMMs.
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8 MB	Remove all four 256k SIMMs, install eight 1MB SIMMs
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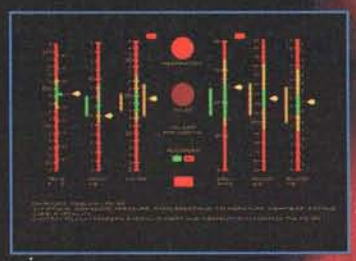

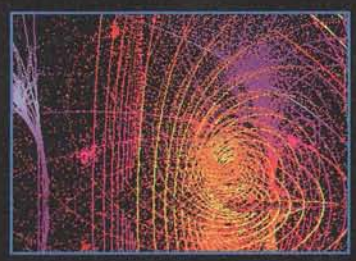

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How Butterflies Transform

The butterfly passes through several stages in its glorious transformation from egg to the completed creature that we all visualize as the butterfly. The adult female lays between one hundred and several thousand eggs throughout her lifetime each with the potential of becoming an adult butterfly itself.

Each egg, so tiny that it can only be seen by the human eye with the help of a microscope, is laid on or near a plant on which the newly hatched grub will be able to feed. These eggs are often green or yellow, but can also be found in shades of blue or red, each with a shell-like design covering it.

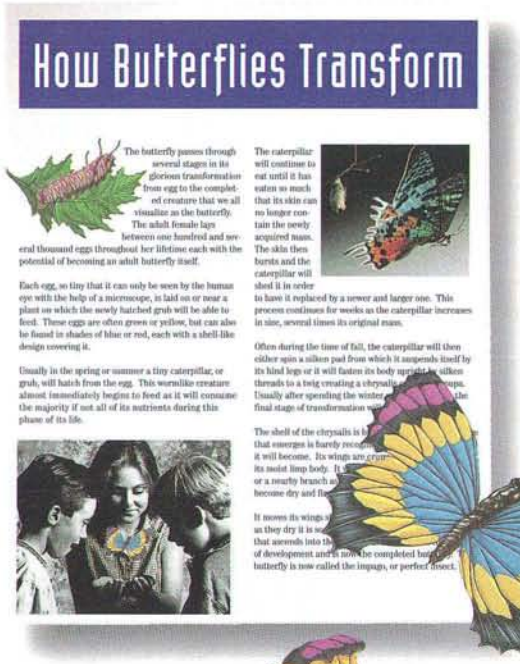
Usually in the spring or summer a tiny caterpillar, or grub, will hatch from the egg. This wormlike creature almost immediately begins to feed as it will consume the majority if not all of its nutrients during this phase of its life.

The caterpillar will continue to eat until it has eaten so much that its skin can no longer contain the newly acquired mass. The skin then bursts and the caterpillar will shed it in order to have it replaced by a newer and larger one. This process continues for weeks as the caterpillar increases in size, several times its original mass.

Often during the time of fall, the caterpillar will then either spin a silken pad from which it suspends itself by its hind legs or it will fasten its body upright by silken threads to a twig creating a chrysalis or exposed pupa. Usually after spending the winter months dormant, the final stage of transformation will take place.

The shell of the chrysalis is broken open and the creature that emerges is barely recognizable as the butterfly that it will become. Its wings are crumpled and kept close to its moist limp body. It will remain clinging to the cocoon or a nearby branch as its form gradually begins to become dry and firm.

It moves its wings slowly at first with little strength but as they dry it is soon ready to take flight. The creature that ascends into the air has been through its final stage of development and is now the completed butterfly. This butterfly is now called the impago, or perfect insect.



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It moves its wings s as they dry it is so that ascends into th of development and is now the completed bu butterfly is now called the impago, or perfect insect.

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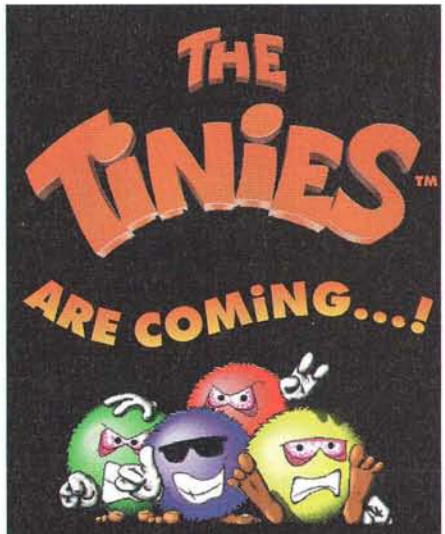

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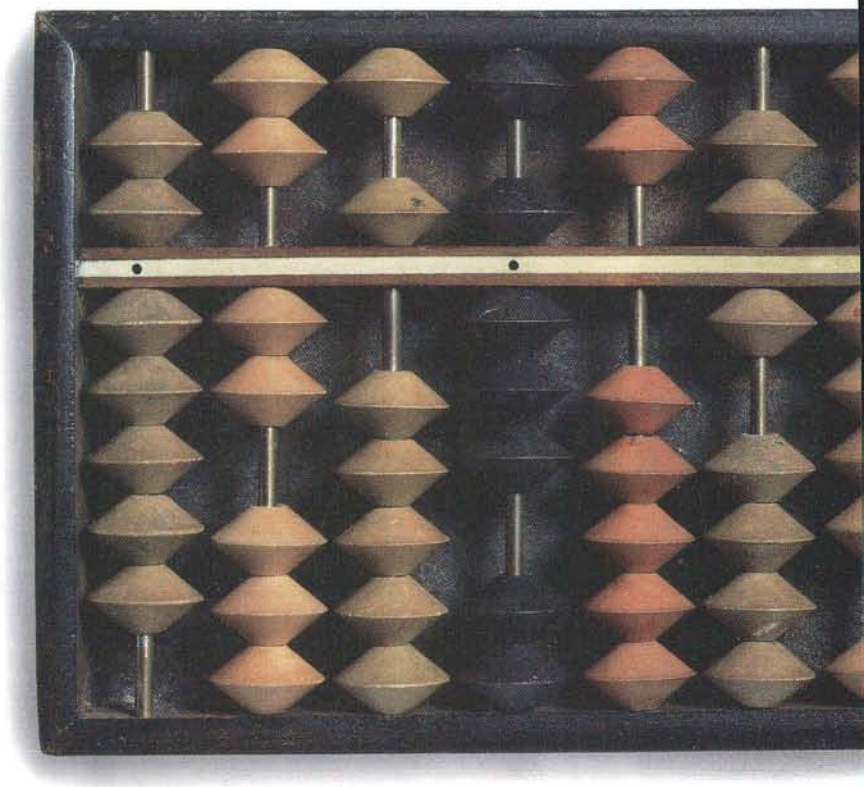
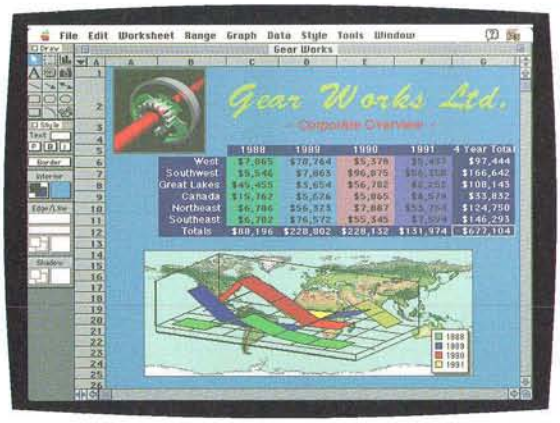
It's been centuri
with number

The abacus first appeared around 500 or 600 B.C. Some say it was invented by the Egyptians. Others think it was the ancient Chinese. But whoever it was, they had the right idea: create a simple, easy-to-use device for working with numbers, and people will be a lot more productive.



Introducing 1-2-3 for Macintosh Release 1.1: the easiest-to-use Mac® spreadsheet.

Like the abacus, 1-2-3® for Macintosh® was inspired by simplicity, and Release 1.1 is even simpler to use. Now you can drag-and-drop data between worksheets. And with new SmartSum, you can simultaneously sum multiple ranges. Plus, Copy Down, Copy Right and Copy Back enable you to copy labels or formulas across columns, rows or 3D worksheets.



New graphing enhancements in Release 1.1 let you turn your numbers into graphic presentations faster and easier than ever.

Of course, 1-2-3 is still the only spreadsheet that gives you In-Cell™ editing, so you can enter a formula directly into a cell for faster, easier editing.

The easiest graphing of any Mac spreadsheet.

1-2-3's remarkable graphing and charting capabilities make it the best Macintosh spreadsheet for presenting data. Because unlike Microsoft® Excel, 1-2-3 lets you store your graphs and charts in the same file as your worksheets. So you can manipulate data, text and graphics all in the same file with *one* set of menus and only *one* set of tools. And you can make one-click graph type changes, pull objects across window boundaries to the

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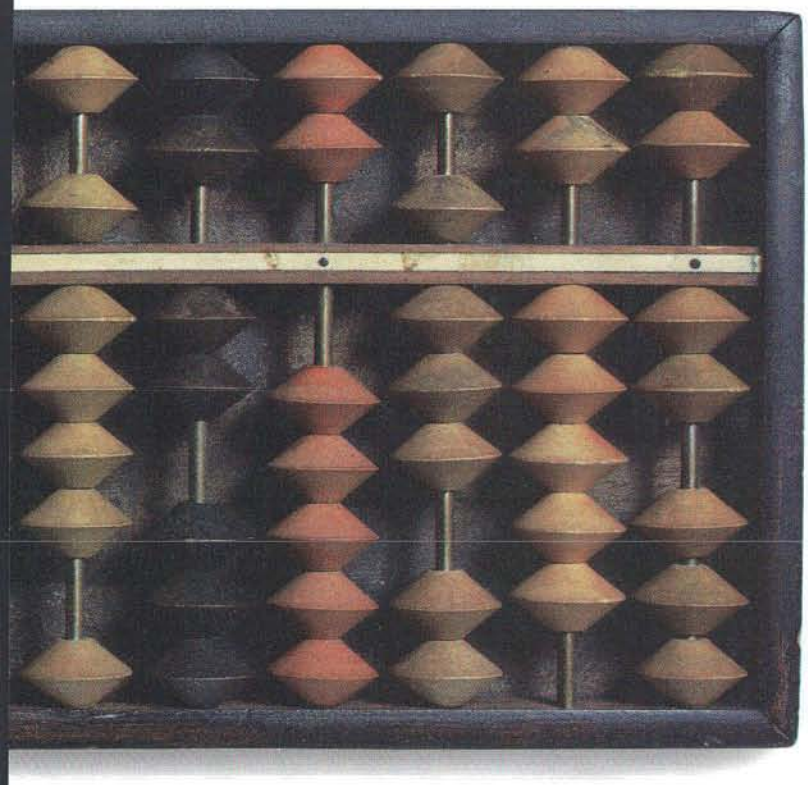

True 3D makes organizing and analyzing data fast and easy.

Only with the true 3D capabilities of 1-2-3 can you easily consolidate multiple spreadsheets into *one* file without having to link the files. 3D allows all spreadsheet functions to be performed *through* multiple worksheets just as they are performed down rows and across columns.

The easiest transition from DOS to Mac.

For DOS spreadsheet users moving to Macintosh, 1-2-3 is the only way to go. 1-2-3's traditional Classic® Menu makes it easier for you to access familiar 1-2-3 commands and to run macros already written for 1-2-3. And only 1-2-3 offers cross-platform capabilities, so you can work more efficiently and productively with the 18 million other 1-2-3 users across all major platforms.

worksheet, dynamically link chart titles to cell contents, and shrink charts so they appear as small icons on your worksheet.

Now Release 1.1 takes these graphing capabilities even further. Like the ability to paste pictures behind your graphs, stack pictures to form bar charts, and view your graph source data by scrolling up the bottom edge of your graph. You can even resize chart text simply by using the mouse to drag the handles.

1-2-3 for Macintosh. All in all, it's the easiest way to work with numbers to come along in centuries. To find out for yourself, buy a copy from your Lotus Authorized Reseller,* and try it for 60 days with a full money-back guarantee direct from Lotus.® Or call **1-800-TRADEUP, ext. 7244**** for a free working model. (Excel users be sure to ask about our special upgrade price:***)

Lotus 1-2-3 for Macintosh

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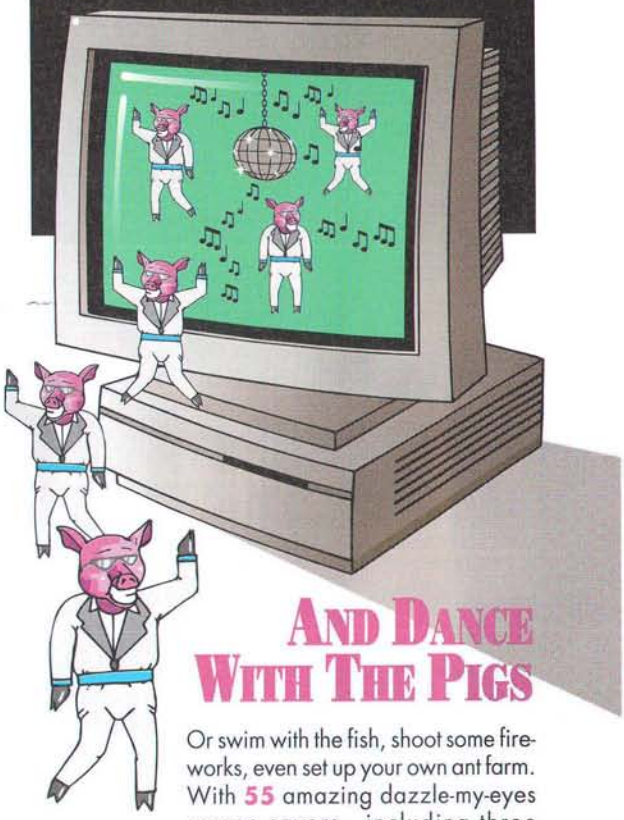

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Lab Notes

LCD Panels: Crystallizing Screen Displays

BY TIM WARNER

CRT DISPLAYS—THOSE HEAVY, EYE-fatiguing monitors that have been an integral part of every desktop computer system—may soon give way to a new breed: the LCD (liquid crystal display) panel. Panels have a lot going for them—they're visually pleasing, consume a fraction of the power a monitor requires, and occupy much less physical space. Light and reliable, they're perfect for the next wave of computers, miniaturized to sit on our laps and in our hands.

That's the good news. Now for the bad. The passive matrix technology used in the lower-cost PowerBooks (the 100, 140, 145, and 160) provides poor screen performance, while the active matrix displays found in the 170 and 180 offer much sharper visuals but carry a correspondingly steeper price tag. As a result, users have been forced to choose between low price and high performance. But during Macworld Lab's testing of LCD panels for "Crystal-Clear Presentations," we discovered that a newly developed technology called *active addressing* is combining the best of both methods to achieve the performance of active matrix at a fraction of its cost.

HANK OSUNA

Contrasting Performance

LCD PANELS DISPLAY INFORMATION by combining polarizing filters with liquid crystal subjected to an electric field. Each pixel on the display is formed by a cell of liquid crystal material (in color displays, each pixel is composed of three subpixels—one each for red, green, and blue).

The degree of contrast—the range of grays between black and white—determines the sharpness of text and graphics on the screen. In other words, the greater the difference between the blackest black and the whitest white a screen can display, the more clearly we see detail. Greater contrast for graphics means levels of gray are more easily distinguished. Higher contrast for text means greater legibility, perceived as better focus; while low contrast means washed-out, and often blurry, text.

LCDs achieve high contrast by raising the average voltage passing through a pixel. When enough voltage is applied to the liquid crystal material, the pixel becomes black (opaque). Panels have a background voltage at which pixels are white (transparent). The *response time*—the time it takes for liquid crystal material to change color—determines the speed at which pixels disappear or appear when information on the screen is changed and also determines each pixel's contrast ratio. The higher the contrast ratio, the more legible the display. A contrast ratio that's acceptable to the human eye ranges from 6:1 to 8:1. On an LCD panel, a more typical ratio is 10:1, and very good LCD displays have ratios as high as 25:1 or above.

The Pitfalls of Passive Matrix

A PASSIVE MATRIX LCD USES A MATRIX of electrodes (flat wires) to send a 20V pulse through each row of pixels on the screen every 1/60 second (or 16.7 milliseconds), which means the LCD's *frame rate*—how often it refreshes the screen—is 1/60 second. A column driver applies a second, lower voltage to each column to turn the pixels on and off. The combination of row and column voltages determines whether a pixel is black or white or some shade in between. (For more details on this process, see the diagram "How Color LCDs Work," on page 159.)

continues

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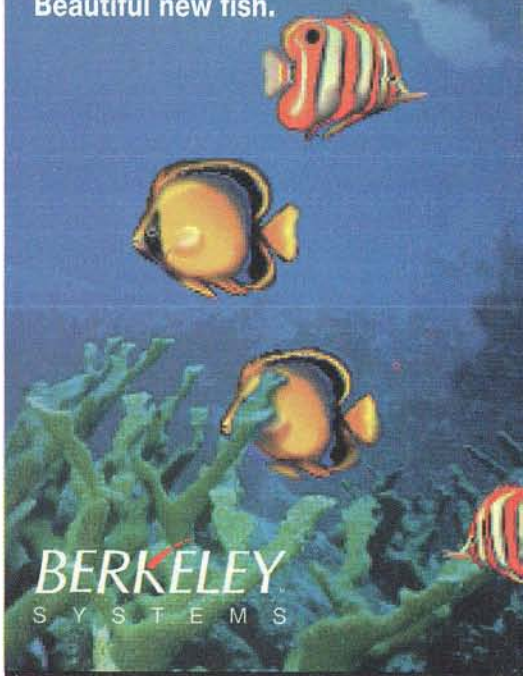

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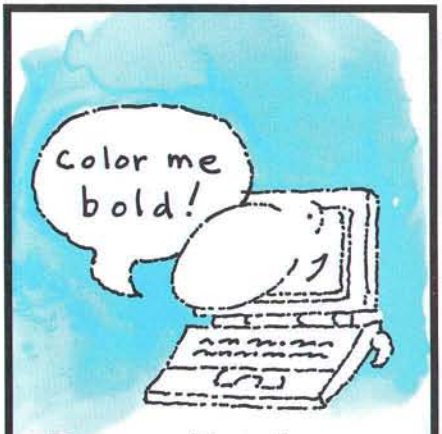

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Because voltage levels taper off between pulses, and the liquid crystal material's response time is considerably slower than the LCD's frame rate, the electrodes may need to send that 20V pulse through the rows of pixels as many as 15 times before the liquid crystal can reach the average voltage needed for high contrast. If an image or element moves on the screen—for instance, if you move the cursor—the liquid crystal cannot respond quickly enough to keep up with the changing screen. The result? Blurry, washed-out images—the moving cursor may blur, leave a trail, or even disappear. Only pixels that change infrequently—giving the controller enough time to sufficiently boost the liquid crystal's voltage—ever reach the full contrast ratio the LCD panel can attain.

Maintaining an LCD panel's high contrast ratio can be compared to sustaining a high water level in a leaky bucket. As a steady stream of water continuously leaks out of the bucket, the water level drops. But suppose you pour a cup of water into the bucket at frequent, regular intervals—at a rate faster than the rate of leakage. Each time you add a cup, the water level rises a bit higher until eventually it reaches the top of the bucket.

Faster Response Times

ACTIVE MATRIX DISPLAYS IMPROVE response time by using transistors to focus voltage on individual pixels. Every pixel on the screen has its own transistor; a 640-by-480-pixel monochrome screen has slightly more than 300,000 transistors. Each one maintains and rapidly changes, the voltage within the liquid crystal cell of a particular pixel. With the electric field concentrated on them, the liquid crystals that form a pixel respond much more quickly—in 30ms to 50ms—than the crystals in existing passive matrix displays.

Difficulties inherent in the manufacture of active matrix displays—which involves meticulously laying down thin films of transistors in a complicated patchwork—make for a high rejection rate of panels. An acceptable screen must have fewer than 10 faulty transistors out of 300,000. This makes the yield of good screens low (by some estimates as low as 10 to 15 percent) and the price very high.

Active Addressing: The Best of Both

THAT MAY CHANGE SOON. IN FOCUS OF Tualatin, Oregon, is developing active addressing, a new approach to activating a pixel that uses special processing chips called application-specific integrated circuits (ASICs). Active addressing, using liquid crystal materials that have a shorter response time, can achieve screen performance as good or better than current active matrix technologies. Motif—a new company jointly owned by In Focus and Motorola—plans to use passive matrix's economical manufacturing techniques to produce active-addressed LCD displays.

Active addressing uses passive matrix technology but achieves screen performance comparable to that of active matrix. Like passive matrix, active addressing requires two electrodes: one for each row, and one for each column. The row and column electrodes supply voltages to the pixel formed at their intersection and activate that pixel by raising the average voltage to the point where the liquid crystal turns black. However, unlike currently available active matrix panels, active-addressed panels do not produce a huge voltage pulse on the rows. Instead, circuitry much like the column drivers on current passive matrix panels is used on the row electrodes to activate the pixels in a constant mathematical pattern, and a special, multilevel driver (controller) is used to send small pulses in complicated patterns to the whole column. The timing of the pulses keeps the average voltages in each pixel high, and raises them both wherever and whenever needed to the 3V needed to turn a pixel black.

The liquid crystal material used by active-addressing passive matrix panels also has a fast (50ms) response time, comparable to that of an active matrix panel. This in combination with a high average voltage enables these panels to display full-motion video with the same quality as that produced by an active matrix panel.

Since the row and column patterns used by active addressing are based on mathematical formulas, applying the technology to ever-larger displays will be possible as soon as the appropriate panels and column drivers are available. So far, In Focus has developed active addressing only for 640-by-480-pixel screens.

Although LCD panels equipped with active addressing will initially cost an estimated 25 percent more than regular passive matrix panels, active-addressed panels will still be priced far below currently available active matrix panels. LCD panels with active addressing will not be available for about a year because the ASICs are still in development.

With its ability to provide high-quality screen performance at a reasonable price, active-addressing technology promises to make LCD panels more popular. Perhaps the best news of all is that active addressing may eventually lower prices of the most expensive LCDs of all—color LCDs. In fact, within the foreseeable future, those clunky old CRT monitors just might disappear altogether. **m**

WARNING
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Don't say we didn't warn you. Because the PLI MiniArray runs a little faster than you're used to. But we figure you could get used to it.

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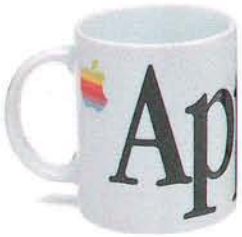

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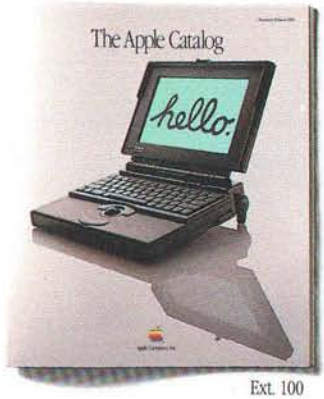

Ext. 100

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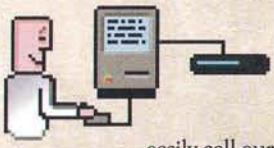
WHY DO I NEED A SUPRA FAX MODEM?

Why do I need a fax modem? That's exactly what I thought! As a graphic designer at Supra, my job is to design great-looking stuff, not to use our products. So I was skeptical — and downright reluctant — when my boss told me to start using a SupraFAXModem.

But I tried it. And I love it! Here's why...

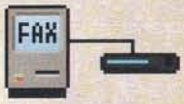
SAVES TIME. Now I have extra time because I don't wait in line at the fax machine anymore — in fact, I don't even leave my desk! I simply use the Chooser to select the modem (instead of a printer), "print" an open file, and tell the modem where to send it. It only takes a minute!

SAVES MONEY. Besides the money we save because I'm designing instead of "chasing paper," I save a lot by using the SupraFAXModem's data capabilities. It's usually less expensive to transfer a file using my modem than to use an overnight delivery service. And because SupraFAXModems feature V.42bis data compression, my files transfer up to 4 times faster — which means lower long-distance charges! It has also saved me when I've forgotten important files at work, because I can easily call our network and retrieve them using **AppleTalk Remote Access.**



EASY TO USE. Not being particularly technical, I was a little intimidated when my boss dropped the modem on my desk and said "Go for it." But getting started was easy. The SupraFAXModem for Macs has everything I need in the box — FAXstf™ and MicroPhone™ 1.6 software, cables, and manuals — so I dove in. A great little 16-page manual walked me through installing the modem (which went really fast), sending and receiving my first faxes, and transferring data files. The software was easy to use, worked great with my Mac, and did everything I wanted it to. Before I knew it, I was using a fax modem!

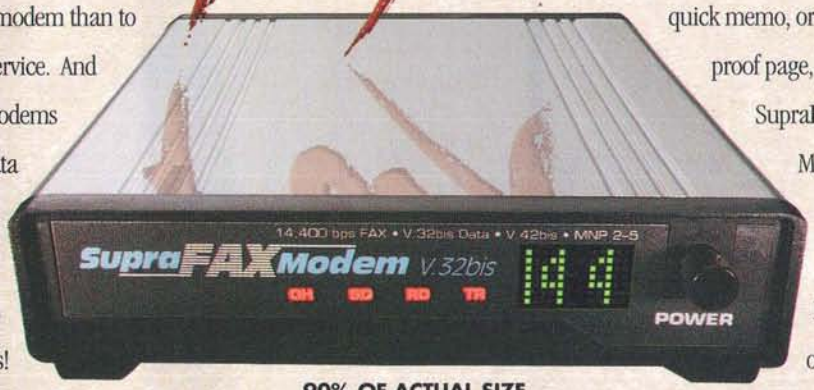
GREAT FAX QUALITY. As a graphic designer, I care about how things look. That's why I was thrilled when I saw how clear the faxes I send look when they reach the fax machine on the other end! It doesn't matter whether I'm sending a quick memo, or a proof page, the SupraFAX-Modem faxes a near laser quality, perfect page.



GOOD FOR THE PLANET. And to top it all off, my SupraFAXModem Modem lets me avoid extra printouts and non-recyclable fax paper!

I strongly recommend that all Macintosh owners consider the benefits of using a **SupraFAXModem.**

Randy Hill
Supra Graphic Designer



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MACWORLD News

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SuperMac Monitor • Portable Hard Drives • Low-Price Claris Software • Microsoft Word Upgraded • 3-D for Illustrators

BY DAN LITTMAN AND TOM MORAN

ROBERT PERRY

THE WRITEMOVE II WEIGHS 2½ POUNDS AND RUNS FROM BATTERIES OR AN AC ADAPTER.

GCC's Portable Printer for PowerBooks

Designed to complement the style and portability of PowerBooks, the WriteMove II from GCC Technologies is a portable thermal-fusion printer that offers 360-dpi resolution and weighs only 2½ pounds. The WriteMove II can operate from internal batteries or from a supplied AC adapter. The printer produces a page of text in about two minutes, according to the company.

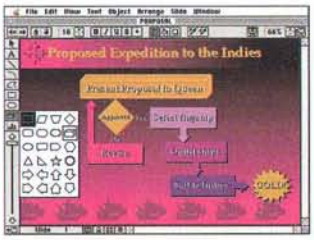
The QuickDraw-based printer comes equipped with 21 fonts and includes Adobe Type Manager and TrueType support. Available now, the WriteMove II printer costs $599 when purchased direct from GCC. The company said it predicts a street price from its dealers of about $499. GCC, 617/890-0880.—T.M.

PowerPoint Returns

FOR FOUR YEARS Aldus Persuasion had no serious competition in the Mac presentation-software market. Now serious competition has arrived: Microsoft PowerPoint 3.0.

Each of PowerPoint 3.0's four views—outline, slide, notes, and slide sorter—has a master page for placing standard elements. The outliner has a lot of features, and its tools are available to format text anywhere—even inside objects drawn on slides with the new drawing tools.

Version 3.0's on-screen presentation capabilities are impressive, including many types of transitions and the ability to convert a bullet-point slide into a self-building series. The new version can time a user advancing through slides while rehearsing a presentation, then use that timing automatically during a live presentation.

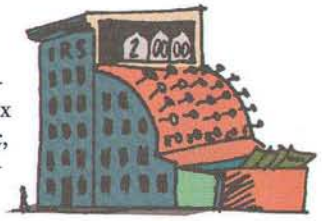


POWERPOINT 3.0'S PALETTE OF DRAW OBJECTS. EACH OBJECT CAN BE MODIFIED IN SEVERAL WAYS BY THE USER.

Version 3.0 can walk nondesigners through selecting a color scheme. It comes with 40 templates (each in several common formats, such as slides and overheads), and applying a new template doesn't wipe out any changes made to existing slides that deviate from the previously applied template.

PowerPoint 3.0 has a list price of $495 and includes the same add-on modules that are supplied with Word 5.1 for editing equations and graphing. It requires System 7. Microsoft, 206/882-8080.—D.L.

Tax Season Approaches



J. SCOTT CAMPBELL

Good news for Macintosh-using taxpayers. Last year ChipSoft's MacInTax was the only tax software for the Mac, but this year, ChipSoft has a competitor: TaxCut, from Managing Your Money publisher MECA Software.

TaxCut's Interview feature walks you through your taxes with a series of questions. The program can audit your return for mistakes and inconsistencies and can trace a line item back through all the forms and worksheets that generated it.

MacInTax has a new EasyStep feature that is similar to the Interview feature in TaxCut. ChipSoft is also publishing a new program called Personal Tax Planner ($49.95).

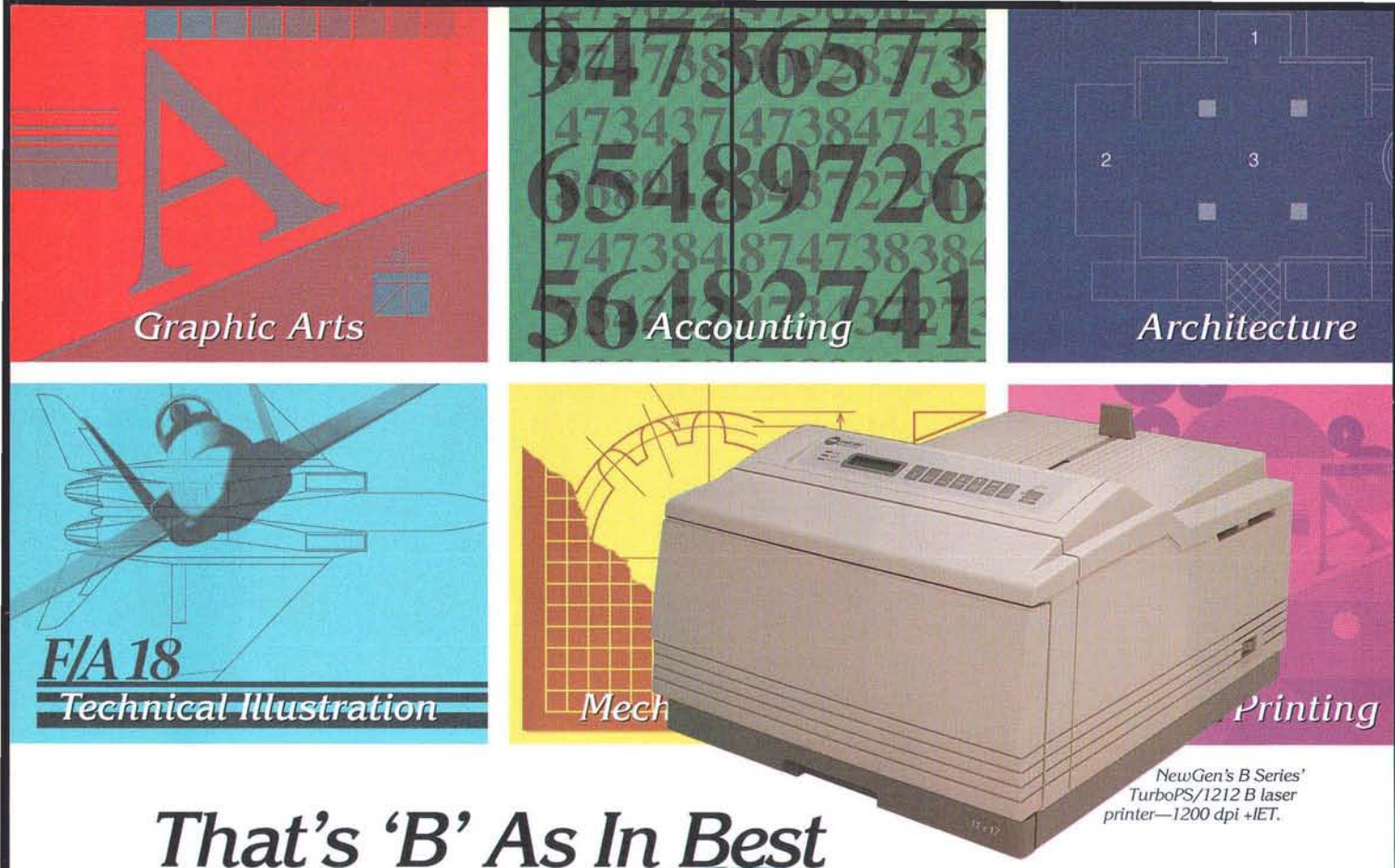
Both companies ship early-bird versions, followed by free upgrades after the IRS finalizes tax forms. Both products list for $79.95. MacInTax offers forms for 15 states at $49.95 each; TaxCut has California and New York forms at $49.95 each. ChipSoft, 619/453-4446; MECA, 203/256-5000.—D.L.

High-Resolution Network Printer

Designed to support up to 20 users in complex networked environments, the QMS 1725 laser printer produces 17 ppm at 600 dpi by 600 dpi and can accept data from its multiple ports simultaneously. For faster output the printer can also operate at 300 dpi. The 1725 is the latest in the QMS printer line to use the company's Crown print architecture, which is designed for controlling spooling, emulations, font management, and other functions.

The printer comes with

continues



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8MB of RAM expandable to 32MB, a serial port, a parallel port, and a LocalTalk connector. Users can add an optional Ethernet or token ring interface. The 1725 emulates PostScript Level 1 and Level 2 and PCL 4. As files are downloaded the 1725 senses their format and switches to the correct page-description language, according to QMS. Other printer emulations are also available.

The QMS 1725 printer lists for $5995. The company said it has scheduled its first shipments for November. QMS, 205/633-4300.—T.M.

Organizing Your Life

Nolo Press, publisher of books and software aimed at demystifying the law, has revised Personal RecordKeeper (formerly For the Record) to version 3.0. Personal RecordKeeper is a place to organize and record all your important personal information, with forms for inventorying your possessions, recording financial information, listing where you store spare house keys, and so on.

The wide-ranging documentation includes information on how to store paper files safely; how to buy appropriate home insurance; how to deal with hired help; and how to prepare for your own death. Personal RecordKeeper lists for $49.95. Nolo Press is at 510/549-1976.—D.L.

STEVEN MECKLER

DIGIMATIC USER MARK HANNA MANAGES THE PHOTOGRAPHY DEPARTMENT AT KITT PEAK NATIONAL OBSERVATORY.

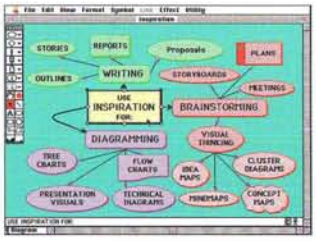
Converting Pictures into Numbers

There are plenty of tools for converting numbers into graphs, but digiMatic is a tool designed for converting graphs back into numbers. digiMatic analyzes graphs and charts scanned from books, journals, and other sources, and extracts their *X*, *Y* coordinates.

digiMatic began life as a desk accessory, but the new version, 2.0, is an application. It can scan and analyze images automatically and retains version 1.0's support for hand-tracing source material. digiMatic can extract up to 5000 points and analyze multiple curves in a single graph; can align images correctly before analyzing them; allows users to delete some points on a curve; and can calculate the area under a curve. It lists for $249 (academic price is $149). FEB Software, 804/222-2215.—D.L.

New Inspiration

INSPIRATION SOFTWARE (formerly Ceres Software) is upgrading its brainstorming, flowcharting, and outlining tool Inspiration to version 4.0.



AN INSPIRATION 4.0 DIAGRAM SHOWING THE NEW VERSION'S CURVED LINES AND CUSTOM NODE SYMBOLS.

The new version's flowcharting and diagramming view has drawing tools (drawings are hidden when you switch to outline view), 63 predefined common node symbols, and room for 100 user-drawn symbols. It also provides headers and footers.

Outline view adds support for splitting a topic or selecting and dragging multiple topics, including discontiguous ones; and has improved word processing and printing features.

Inspiration Software says version 4.0, which lists for $249, is also much faster and can import files from Symantec's More III. Inspiration Software, 503/245-9011.—D.L.

News

SuperMac 17-Inch Monitor

The SuperMatch 17 T from SuperMac Technology is a 17-inch, small-footprint monitor that's available in multiple resolution modes. The color monitor lists for $1229, which at press time, the company said was the lowest price going for a monitor of its size. When purchasing the monitor, the user has a choice of models with 1024 by 768 pixels (to squeeze the largest images onto the screen), 832 by 624 pixels (WYSIWYG mode), or 640 by 480 pixels (which magnifies what would be displayed on a 13-inch monitor).

The SuperMatch 17 T meets the Swedish MPR II guidelines for magnetic-field emissions, according to SuperMac. The monitor began shipping in October. SuperMac, 408/245-2202.—T.M.

ROBERT PERRY

THE SUPERMATCH 17 T MONITOR HAS MULTIPLE RESOLUTIONS AND LISTS FOR $1229.

Logica 50MHz 68030 Accelerators

LOGICA RESEARCH has entered the accelerator race by announcing the Logicache 50MHz '030 accelerator board, which comes in versions for the Mac IIsi and Mac IIci. The board boosts performance of those systems by 200 percent to 350 percent depending on the application, according to Logica.

True to its name, the accelerator includes a 50HMz 68030 microprocessor, plus a 64K cache. The IIsi product comes with a two-slot adapter board so that installing the Logicache accelerator does not prevent further expansion of the system. The accelerator fills one slot on the adapter, leaving the other slot available for a second board.

The Logicache 50MHz '030 also has a socket for an optional $200 math coprocessor chip for speeding up intensive math operations. Without the math coprocessor the IIci version lists for $1299 and the IIsi version lists for $1339. Both products are shipping now. Logica, 512/836-2168.—T.M.

TURKEY SHOOT

DESIGN FLAWS NOTED

System 7 Aliases If you run System 7 and you try to open a locked file dating back to 1984 or 1985, you may get a mysterious dialog box telling you that your file looks like an alias but really isn't one. Seems that nowadays the Mac uses the same piece of the file to identify aliases that was formerly reserved for identifying locked files. (The problem is harmless.)

Outbound Notebook Computers So you packed your Outbound 2030E or 2030S with 8MB of RAM. Wonder why you can't open any files bigger than 4MB? It's because Outbound breaks the memory into two blocks, one of them stuck at 4MB. If you fill it up with 16MB of RAM, you'll have a block of 4MB and one of 12MB.

Macworld will send you a Turkey Shoot T-shirt if we shoot your turkey in this column. See *How to Contact Macworld*.

(Social Security #566-39-2966)

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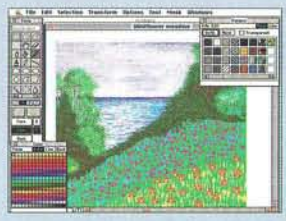
TREND

Claris's New Line



A PASTORAL SCENE RENDERED IN BRUSH STROKES, ONE OF THE FIRST OF CLARIS'S CLEAR CHOICE PRODUCTS.

In a bid to expand into the low-price software market, Claris is going to distribute third-party products under the label Clear Choice. Some Clear Choice software will be products already available from small companies that lack marketing clout—for example, Clear Choice will market MVP Software's text-retrieval utility Retrieve It, originally $129, for $69. Other packages will be first-timers.

In the first-timer category is Brush Strokes, a 32-bit color paint program developed in Sweden for Casady & Greene. Brush Strokes, which will list for less than $150, has many high-end paint features, including photo-editing tools, a multicolor spray can, support for add-on tools (including Adobe Photoshop and Gallery Effects add-ons), and documentation that purports to teach the "artistically impaired" how to paint. Claris is at 408/727-8227.—D.L.

ANDY FREEBERG

THREE MACS, THREE AMIGAS, ONE NETWORK: SIX HUBSTERS REHEARSING FOR A COMPUTER-ASSISTED CONCERT.

The Hub

What do you hear when three musicians play Macs and three play Amigas? Chaos, according to six musicians who call themselves The Hub, but chaos in the scientific sense of natural complexity. When The Hub is on stage, the computers are networked together and are exchanging information that affects each other's output. Each piece the group performs is carefully designed with rules for how information is communicated between the players; the resulting music is neither random, improvised, nor composed. The same piece may not sound the same twice, but it still has its own character. "When it works out well," says Hubster Phil Stone, "it ends up being a sort of digital organism with an unpredictable behavior." A CD of The Hub's music is available from Artifact Recordings, 510/540-5539.—ANN GARRISON

Document Warehouse

IMARA DEVELOPS SYSTEMS for scanning, annotating, and archiving large quantities of paper documents.

Each document saved in Imara's database has a form associated with it for including keywords and a description of the document (Imara doesn't use OCR to extract the text from documents, so users must add search terms to documents). Users can create overlays to type or scrawl comments on top of the document image, or attach free-form notes. Imara also includes an E-mail–like system for shuttling documents around a network.

The first Mac version uses P.Ink, a third-party product, as the database engine. Later plans call for OCR and full-text retrieval capability and access to Imara archives on PCs.

Pricing will be about $3000 for two users and $9500 for five users. Imara Systems, 416/581-1740.—D.L.

J. SCOTT CAMPBELL

High-Resolution Film Recorder

The FilmPrinter Galleria from Mirus Industries Corporation is a 5000-line, 36-bit film recorder small enough to fit on the desktop. Users can connect a Macintosh and a DOS machine to the FilmPrinter Galleria at the same time; pushing one button toggles between Mac and PC operation.

The film recorder works with standard image-rendering and presentation software and can accurately reproduce any text or image that the personal computer can display on a CRT, according to Mirus. Slated to ship by late November, the FilmPrinter Galleria will list for $10,995. It also requires separate Macintosh and DOS support packages that will list for $595 each.

The company also announced that it will offer Visual Business Systems' Professional Output Manager (POM), which adds PostScript compatibility to Mirus film recorders. The software is available now and lists for $995. Mirus, 408/944-9770.—T.M.

MIRUS INDUSTRIES' FILMPRINTER GALLERIA IS A 36-BIT DESKTOP FILM RECORDER.

News

NewGen's High-Speed, Hi-Res Printers

THE TURBOPS/440N and the TurboPS/440ND from NewGen Systems Corporation are 400-by-400-dpi laser printers that produce 17 ppm and can attach to a variety of networks. Both have a Weitek RISC processor for faster printing and include serial; parallel; LocalTalk; and thick, thin, and twisted-pair Ethernet connectors. The TurboPS/440ND has the added feature of being capable of printing on both sides of a sheet of paper.

The laser printers both contain emulations of Adobe's PostScript, Hewlett-Packard's PCL (for the LaserJet Series II), and the HPGL plotter language. They can sense the type of file that's being sent for printing and switch to the proper emulation, according to NewGen.

The TurboPS/440N has a suggested list price of $5795, and the TurboPS/440ND has a suggested list price of $6495. Both of the printers began shipping in October. NewGen, 714/641-8600.—T.M.

JUST FOR FUN

Minotaur, Anyone?

If you're looking to test your gaming skills against one of those nefarious humanoid types, then Minotaur, the Labyrinths of Crete, might be the arena for you. Minotaur is an interactive network adventure game, and it's probably the first commercial computer game that requires you to play against someone else. You're an adventurer in a complex and magical maze, trying to overcome monsters, avoid traps, throw spells, solve problems, and generally grab any valuables that aren't actively hostile. You know, the American view of life . . . Anyway, at the same time, you have to look out for the other human player or players, who can help you or hinder you, but you can guess mostly which. And those human types tend to have these cunningly clever minds.

Minotaur offers nice 8-bit color graphics. It requires a Mac Plus, System 6.0.5, and 1MB of RAM (2MB for color). The program lists for $89.95, and that includes two copies of the software. You enter the Labyrinth via modem, direct-connect cable, or AppleTalk. Perhaps if you take along a very long cable you'll find your way back. Bungie Software, 312/493-2849.—T.M.

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STATISTICA/Mac™ A complete statistical data analysis system with hundreds of presentation-quality graphs integrated with all procedures ■ In-depth, comprehensive implementations of: *Exploratory techniques; Descriptive statistics; Frequency tables; Large selection of nonparametric tests; Stepwise multiple regression methods with extended diagnostics; General nonlinear estimation (with predefined or user-specified models); Logit/Probit analysis; General implementation of ANOVA/ANCOVA/MANOVA/MANCOVA (designs of practically unlimited complexity, repeated, nested, incomplete, random, changing covariates, contrast analyses, post-hoc tests, custom designs); Discriminant function analysis statistics; Canonical analysis statistics; Time series modeling techniques with forecasting; Factor analysis with rotations; Cluster analysis (incl. hierarchical, k-means, and 2-way joining); General survival/failure time analysis (incl. life tables, group comparisons, and regression models); Distribution fitting (a large selection of continuous and discrete distributions); Curve and surface fitting and smoothing (incl. spline, DWLS, NEXP, and others);* and much more ■ Manual with comprehensive introductions to each method and step-by-step examples (Quick Start booklet explains all major conventions); balloon help ■ Extensive data management facilities: a super-fast spreadsheet of unlimited capacity with formulas (and Publish and Subscribe); merge/split files; "double identity" of values (numeric/text); BASIC-like data transformations programming language; Import/Export data and graphs from/to Excel, MacSS, CSS and other formats ■ Graphs integrated with all procedures (e.g., click on a correlation coefficient to produce the corresponding scatterplot and other graphs; click on a variable in the descriptive statistics table to produce a histogram and other graphs; click on an interaction effect in the ANOVA table to see a plot of interaction) ■ Large selection of 2-dimensional graphs: *Histograms (incl. multiple, clustered breakdowns, overlaid functions), Scatterplots (incl. multiple, weighted frequency, smoothed, function fitting), Multiple line and Range plots, Trend plots, Standard deviation plots, Data sequence diagrams, Contour plots, Box-and-whisker plots, Column plots, Bar graphs, Double pie charts, Scrollable dendrograms, Two-way joining plots, Curve fitting plots, Distribution comparison plots, Range plots, Probability plots, Amalgamation plots, Factor space plots, Casewise outlier and residual diagrams, ANOVA interaction plots, Multivariate (multiple) matrix plots, exploratory Draftsman plots with histograms,* and many other specialized plots ■ Large selection of 3-dimensional graphs: *3D surface plots (with data smoothing procedures, color or gray-scale shading, and projected contours), 3D scatterplots, 3D block scatterplots, 3D axis (space) plots, 3D spectral plots with adjustable planes, 3D line/ribbon plots, 3D sequence block plots, 3D histograms, 3D surface-smoothed frequency plots, and 3D range plots ("flying boxes")* ■ All 3D plots displayed in true perspective, feature interactive real-time rotation facilities (incl. continuous rotation) ■ Extensive graph customization options: all structural aspects of graphs (axes, scaling, patterns, colors, sizes, styles, regions, perspective, rotation, fitted functions, etc.); MacDraw-style tools with specialized "objects"; hi-res graph and artwork embedding; page layout/preview; dynamic rulers; Publish and Subscribe graph links ■ All output displayed in Scrollsheets™ (dynamic, internally scrollable tables: all numbers can be instantly converted into a variety of on-screen customizable, presentation-quality graphs) ■ All Scrollsheets can be saved into data files and used for input, or exported ■ Flexible facilities to perform analyses on specific subsets of data ■ Extremely large analysis designs ■ Unlimited size of files ■ Extended precision ■ Unmatched speed (e.g., on a Mac IIfx, arbitrary rotation of a surface with 1,000 points takes 1 second; correlation matrix 50x50 with 100 cases—less than 3 seconds; transposing a 5,000 data points file—less than 2 seconds) ■ Full support for System 7 ("savvy") incl. "Publish and Subscribe," Apple events, balloon help, "drag and drop," 32-bit, Quadra cache, etc. ■ Price: **$595.**

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Circle 99 on reader service card

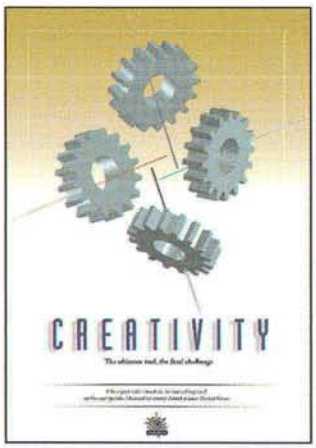
News

Three-Dimensional Drawing

ADOBE ILLUSTRATOR is a 2-D illustration package, and Ray Dream Designer is a 3-D modeler and rendering package. Now Adobe and Ray Dream are taking a half-step into each other's territory with products that straddle the line between 2-D and 3-D.

Adobe's $199 Dimensions can import PostScript text and drawings from Adobe Illustrator, Aldus FreeHand, or other 2-D draw packages; extrude or lathe them into three dimensions; and rotate them (Dimensions also has some 3-D primitives for creating basic shapes). In Dimensions you can map graphics onto 3-D objects—for example, wrap a label around a bottle—set up surfaces, and add lights. Dimensions images can be returned to a 2-D program and edited as Bézier curves. Adobe is at 415/961-4400.

Ray Dream's $179 AddDepth is similar to Dimensions but has a tool for users to set up perspective in drawings, and artwork can be mapped to the surface of a 3-D object in proper perspective. AddDepth users can switch between the 3-D environment and a 2-D environment with 2-D tools, and any surface in a drawing can be used as a drawing plane. AddDepth also has much of Ray Dream's rendering technology. Ray Dream, 415/960-0765.—D.L.



A COMPOSITE OF ARTWORK CREATED IN ADOBE ILLUSTRATOR AND ARTWORK EXTRUDED INTO 3-D USING DIMENSIONS.

DESKTOP LIBRARIAN

Books on Microsoft Works 3

This month we check out two volumes on the subject of Microsoft Works 3.0 for the Macintosh.

- *Macworld Guide to Microsoft Works 3*, by Barrie A. Sosinsky (1992, $22.95). Written for beginners and intermediate users, this well-organized 433-page volume starts with a section that introduces the features of various modules of Works, then moves to a section on using Works' tools; other sections cover integrating the tools and using advanced features. Organized into overviews, step-by-step sections, and tips, this well-illustrated volume includes a removable quick-reference card, an index, and a glossary. IDG Books Worldwide, 415/312-0650.
- *Using Microsoft Works 3 for the Mac*, by Greg Schultz (1992, $24.95). Intended for beginning and intermediate levels, this 463-page tome has six major parts: starting with Works; using the word processor, drawing program, spreadsheet, and database; using advanced features, including communications. This book offers tips and techniques, lots of screen shots, and an index, but no glossary. Que Corporation, 317/573-2500.—T.M.

ROSEMARY WILTON

USING MICROSOFT WORKS 3 FOR THE MAC (LEFT), AND MACWORLD GUIDE TO MICROSOFT WORKS 3.

Apple Aims to (SNM)Please

Apple has announced three new software products for large-scale networking. AppleTalk Connection for Macintosh integrates Simple Network Management Protocol into AppleTalk, opening up Mac networks to Unix- or Mac-based SNMP consoles and software. (Under SNMP, each network device actively provides the management console with information about how it is supposed to operate.)

TCP/IP Connection for Macintosh supports connecting Macs to TCP/IP networks, the networking protocol standard in the Unix world.

MacX.400 SD (Single Domain) turns a Mac into an X.400 server (X.400 is a standard for connecting disparate E-mail systems) that connects to a single message-transfer agent so that the server provides X.400 services over AppleTalk networks or other networks. This software also includes administrator's tools to monitor X.400 traffic. For prices call Apple Programmer's and Developer's Association at 408/562-3910.—MATTHEW CLARK

Shiva's Ethernet LanRover

FOR THE POWERBOOKISH among us, Shiva Corporation has devised the LanRover/E for AppleTalk Remote Access, an Ethernet version of the LanRover/L, the company's existing dial-up network server for LocalTalk. With the device installed on the network, remote users can call in via modem and gain access to E-mail, file servers, and groupware. The LanRover/E can be mounted on a rack and comes with a choice of four or eight serial ports; and four or eight users can dial in to the network at once. Each port requires an external modem. The LanRover/E connects to thick, thin, or twisted-pair Ethernet.

TOM GIBSON

SHIVA'S LANROVER/E LINKS REMOTE POWERBOOKS TO ETHERNET NETWORKS VIA APPLETALK REMOTE ACCESS.

The four-port version will list for $1999 and the eight-port model will list for $2999. Both prices include Shiva's Net Manager software. The LanRover/E also comes in a version for Novell NetWare. All models were scheduled to ship in November. Shiva, 617/252-6300.—T.M.

TREND

Faster Optical Drive

Alphatronix has brought out the Inspire II series of high-capacity magneto-optical drives, for which the company claims an effective access time of 14ms. This is considerably faster than most erasable optical drives on the market, although Pinnacle Micro has also begun shipping the PMO-650,

SCOTT PETERSON

THE ALPHATRONIX INSPIRE II SERIES OF ERASABLE OPTICAL DRIVES CLAIM 14MS EFFECTIVE ACCESS TIMES.

a similar drive (see *MacBulletin*, August 1992). The drive gets its speed by using *split optics*, which means that some optical components have been moved off the read-write head, making it lighter and faster.

The drive is available in two versions; one stores 650MB, the other holds 1GB. The Inspire II series is available now at a list price of $4495 for the 650MB model, and $4995 for the 1GB model. Alphatronix, 919/544-0001.—T.M.

Fame.

HP wins first-place awards for Mac-compatible products.

*Macworld, August 1992 ©1992 Hewlett-Packard Company PE12212

Fortune.

HP gives $100 or $50 rebates on award-winning ScanJets and DeskWriters.

HP's Mac-compatible scanners and printers seem to run forever. But our rebate program won't.

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We're also offering a $100 rebate on the HP ScanJet IIc color scanner. With its superior scanning capabilities, it meets all your imaging and text needs.

HP DeskWriters and ScanJets won landslide victories in Macworld magazine's World-Class Awards.* Voted on by Macintosh enthusiasts who subscribe to Macworld.

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*Mac LC, Mac II or Quadra cable adapters available at no charge from your dealer.

News

RICHARD RETHEMEYER

XANTE'S ACCEL-A-WRITER 8100 PRINTER PRODUCES 600 DPI AT 8 PPM USING A RISC PROCESSOR.

Hi-Res Xante Printer

The Accel-a-Writer 8100 from Xante Corporation is a 600-dpi printer that prints on paper as large as 11 inches by 17 inches. The 8-ppm printer incorporates an AMD 29000 RISC processor to speed imaging, 12MB of RAM expandable to 64MB, a TrueType font scaler, and emulations of PostScript Level 2 and PCL 4.

Like a growing number of networked laser printers, the 8100 can accept data simultaneously from its serial port, parallel port, and LocalTalk connector. The printer also features emulation sensing, which means it switches to PostScript or PCL after detecting the format of an incoming file.

The Accel-a-Writer 8100 carries a list price of $3995. Xante plans to begin shipping it in November. The company will also offer upgrades that will boost the printer's resolution to 800 dpi or 960 dpi. Xante, 205/476-8189.—T.M.

VIRUS WATCH

CURRENT VIRUSES, TROJAN HORSES, AND WORMS

T4-A, T4-B

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 10/92
INFO: Initially discovered in a game called GoMoku
IMPACT: Both versions of T4 damage system files and applications

ChinaTalk

TYPE: Trojan Horse
FIRST LISTED IN VIRUS WATCH: 10/92
INFO: ChinaTalk is an INIT that comes with a read-me file that claims it provides a female voice for MacinTalk
IMPACT: Deletes the contents of disk drive on restart

INIT 1984

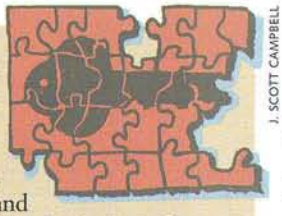
TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 8/92
INFO: Infects INITs; becomes active only on Friday the 13ths
IMPACT: Destroys files and changes file and folder names and attributes to random garbage

Code 252

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 8/92
INFO: Displays a message telling user it is destroying contents of hard drive
IMPACT: After displaying message, it deletes itself without causing damage; infected Macs may behave erratically

TREND

High-Tech John Hancock



J. SCOTT CAMPBELL

Information Security is developing two utility programs to provide security for Macintosh users: SecretAgent, which encrypts data to keep it secret, and dsaSign, which signs documents and then checks them for tampering when they're delivered.

Both products are utilities that can be run on any file. Both use public-key systems based on the Digital Signature Algorithm and Secure Hash algorithm proposals of the National Institute of Standards and Technology. (In public-key systems each user has a public and a private key, or code. Someone sending a document signs it with a private key, which the recipient verifies with the sender's public key; to send an encrypted message, the sender encrypts it with the recipient's public key, which only the recipient's private key can decrypt.)

Site pricing depends on number of users. Pricing for SecretAgent begins at $329.95 and drops to $66 per user for large sites; dsaSign starts at $149.95 and drops to $45. Information Security, 708/405-0500.—D.L.

Microsoft Upgrades Word

Word version 5.1 has a substantial collection of new features. The command ribbon has been replaced with a user-editable tool bar. A new command automates bulleting paragraphs. Text can be annotated with Post-it–like notes. Rows and columns in tables can be dragged and dropped into a new location. Version 5.1 also has a drop-cap feature and an automatic envelope-creation feature, and comes with a graphing add-on (the same graphing module used by PowerPoint 3.0). Gone missing is the scripting language Microsoft originally promised for an interim release. Word remains $495; the upgrade from 5.0 is $14.95. Microsoft is at 206/882-8080.—D.L.

Synthetic Fonts

ARES SOFTWARE is developing a universal font-generator, code-named Chameleon, that uses one master outline and applies algorithmic font descriptions to it to render hundreds of common Macintosh fonts.

Chameleon's font facsimiles are more compact than traditional fonts, since a description takes up only 2K or so, allowing you to fit hundreds of fonts on a single floppy. A font generated from Chameleon can be installed like a normal font, or the font description can be combined with a document and sent to a service bureau, where the Chameleon font can be reconstructed with another copy of the program. Chameleon can also condense or expand characters, change a font's x-height, apply one font's metrics to another, and produce a blend between two fonts. Chameleon will list for $295 and will be available early in 1993. Ares, 415/578-9090.—ERFERT FENTON

Intergraph Revises MicroStation

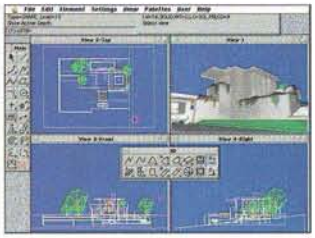
INTERGRAPH HAS REVISED THE MAC VERSION of its high-end CAD package MicroStation to version 4.2, leaving other platforms temporarily behind at 4.1. Its new features fall in several categories.

To its drawing tools version 4.2 adds Non-Uniform Rational B-Splines, or NURBS (the kind of infinitely malleable three-dimensional curves popularized for Macintosh users in Alias Sketch), as well as a multiline drawing tool.

In the presentation area, MicroStation 4.2 supports fly-throughs and can position the camera to look in any direction from anywhere in space. It also adds multiple light sources, Phong and Gouraud shading, and can drop in a bit-mapped image behind a model.

The new version of MicroStation supports a wide range of industry standards for dimensioning, naming layers, and importing and exporting files.

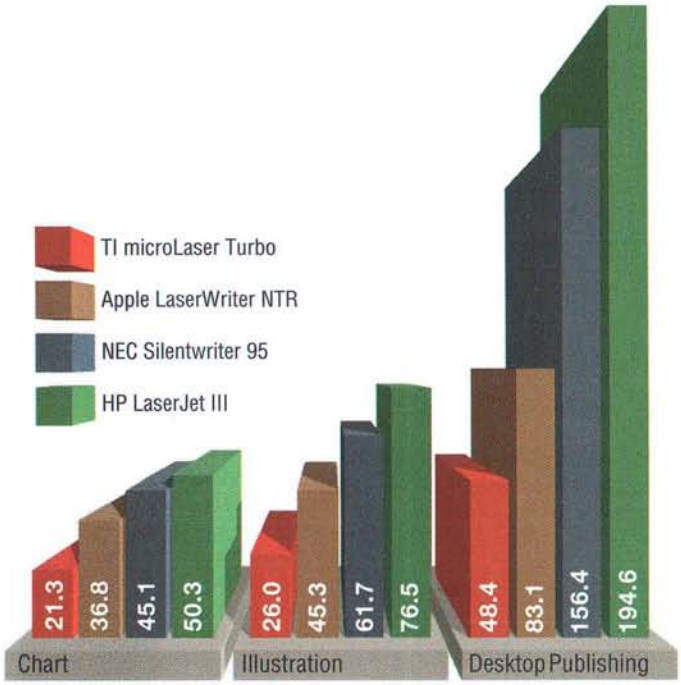
MicroStation lists for $3450. MDL, a C-like language for programming MicroStation add-ons, is available for the first time on the Mac at $1500. Intergraph, 205/730-2000.—D.L.



THE FOUR-WINDOW VIEW OF AN UNUSUAL BUILDING BEING DESIGNED IN VERSION 4.2 OF MICROSTATION.

FASTER FASTER FASTER

LOWER



Total Printing Time In Seconds

It's a fact. Now you can get faster PostScript® printing at a new lower price.

According to benchmark performance tests,* the TI microLaser™ Turbo printer is faster than the Hewlett Packard LaserJet® III, NEC 95 and Apple® NTR when it comes to charts, illustrations and desktop publishing. That's because it sports *two* processors – standard and RISC – for turbo-charged speed.

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POSTSCRIPT Software From Adobe

Your choice of PC or PC/Macintosh® configuration. HP LaserJet II emulation and Adobe® PostScript Level 2 software with 35 of the most popular outline fonts to dress up your documents. Automatic switching between HP and PostScript modes so you can print and go – no set-up, no problem. And the ability to connect simultaneously to more than one computer, Windows™-based or Mac, and print with ease.

Best of all, with its new lower price of $1,749** for the PC model and only $50 more for PC *and* Mac compatibility, the microLaser Turbo is selling fast, too. Call right now for more information on the Turbo or other microLaser printer models. **1-800-527-3500.**

TEXAS INSTRUMENTS

MACWORLD MW EDITORS' CHOICE

MacUser ★★★★

*Call TI for a copy of Genoa Technology's benchmark test results and specifications of models tested.
**Manufacturer's suggested retail price – dealer prices may vary.
microLaser is a trademark of Texas Instruments Incorporated. Adobe, PostScript and the PostScript Logo are trademarks of Adobe Systems, Incorporated, which may be registered in certain jurisdictions. Apple and Macintosh are registered trademarks of Apple Computer, Inc. Windows is a trademark of Microsoft Corporation. The microLaser printer family has earned MacWorld's 1992 Editor's Choice Award and the microLaser Turbo has earned MacUser's 1992 Four Mice award. Reprinted from MacUser, September 1992. ©1992 Ziff Communications Company.

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Circle 313 on reader service card

76532

News

FIVE ATMOSPHERIC RESEARCHERS CROWD THE COCKPIT OF A JET AS IT SEARCHES THE SKY FOR WIND SHEAR.

The Future of Avionics

Wind shear, a sharp boundary between wind currents, has caused 26 airline crashes in the past three decades, making it the number one cause of aircraft-related deaths. By 1995 many airlines will have installed instruments that detect wind shear before the aircraft reaches it. Macintoshes are involved in testing prototypes of wind-shear-detection equipment.

To test the equipment, the Federal Aviation Administration and NASA's Langley Research Center fly a 737 into bad weather searching for wind-shear conditions. The aircraft is packed with instruments that evaluate how well infrared, microwave, and LIDAR (Light Detecting and Ranging) wind-shear sensors perform. Macs on the ground running Mathematica develop mathematical filters—formulas that a sensor's computer uses to eliminate false alarms—and graph the experiments' results.—PHILIP CHIEN

Where Next, Columbus?

ON DECEMBER 6, the Smithsonian's National Air and Space Museum will open its new gallery, "Where Next, Columbus?," which presents the prospects for space exploration during the next 500 years. It features several Mac-based exhibits, with touch-screens and full-motion video, produced by Jack Sculley's San Francisco–based Context Productions. One exhibit raises questions about positive and negative motivations for exploring the unknown. Another invites you to work with an engineer, to design a robot that will journey to Mars and to learn the trade-offs between robotic and human exploration. In a third you act as a crew member on the bridge of a spacecraft, responding to emergencies such as solar flares and dealing with necessities such as recycling air and water. The National Air and Space Museum is at 202/357-1300.
—ANN GARRISON

DESTINATION MARS. THE SPACE STATION YOU ARE LEAVING FILLS THE SCREEN; THE FACE AT LEFT IS YOUR OFFICER.

QMS Color Printers Add EfiColor

QMS has unveiled the ColorScript 210 and 230, RISC-based color printers that use thermal-transfer technology and include EFI's EfiColor Color Rendering Dictionary for improved rendering of photographic images. The ColorScript 210 produces letter- or legal-size output, while the ColorScript 230 prints on paper as large as 11 inches by 17 inches.

Both printers can simultaneously accept data from their serial port, parallel port, and LocalTalk connector and can sense whether to print a file using one of the included PostScript Level 1, PostScript Level 2, or HPGL emulations.

The ColorScript 210 lists for $4995 and the 230 lists for $7995. Both are shipping. QMS, 205/633-4300.—T.M.

SCOTT PETERSON

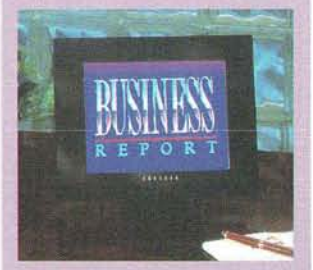
THE COLORSCRIPT 210 FROM QMS IS A COLOR THERMAL-TRANSFER PRINTER WITH EFICOLOR.

TREND

Envisio Color Flat-Panel Display

Envisio has come out with ColorFrame, which the company says is the first external flat-panel color display for the Mac. ColorFrame shows up to 4096 colors when working with a 16-bit or 24-bit adapter. The active matrix LCD device is 9 inches by 12 inches by 2½ inches, small enough to fit in a briefcase. The display area measures 10½ inches diagonally.

The ColorFrame will work with any color-capable Mac including, in conjunction with an Envisio internal color graphics adapter, the PowerBook 140 and 170. The ColorFrame display is expected to ship in December at a list price of $5495. That price includes one cable for Macs and another cable for DOS systems using VGA monitors.



THE ENVISIO COLORFRAME IS AN EXTERNAL FLAT-PANEL DISPLAY THAT WORKS WITH COLOR-CAPABLE MACS.

Envisio has also announced the ColorBook 16, a 16-bit internal PowerBook graphics adapter slated to ship in December at a list price of $1295 including 2MB of RAM. The company will also offer versions with 4MB and 6MB. Envisio, 612/339-1008.—T.M.

BUG REPORT

Microsoft Excel 4.0 If cells are left blank or contain nonnumeric data or formulas, cross-tabulation may return incorrect answers without warning the user.
- Squares created with Excel's drawing tools are slightly elongated when printed on PostScript printers; curiously, a square pasted from Excel into Microsoft Word prints as a square.
- Elongated squares (see above) also affect graph axes, distorting scatterplots and other graphs that depend on relationships between points. Microsoft says it has no immediate plans to release a bug fix for Excel.

StatView 4.0 May crash after printing documents containing TrueType fonts. Abacus Concepts says a bug fix will be available free on request "before StatView 4.1 ships."

MacTools Deluxe 2.0 Unable to optimize floppy disks. Central Point Software says it is working on a bug fix.

Outbound Notebook Computers Transferring files over AppleTalk can be excruciatingly slow. Outbound Systems says version 1.3 of the Outbound software fixes this bug and is available free to Outbound owners.

***MACWORLD* WILL SEND YOU A BUG REPORT T-SHIRT IF YOU ARE THE FIRST PERSON TO INFORM US OF A SERIOUS, REPRODUCIBLE BUG THAT WE REPORT IN THIS COLUMN. SEE *HOW TO CONTACT MACWORLD*.**

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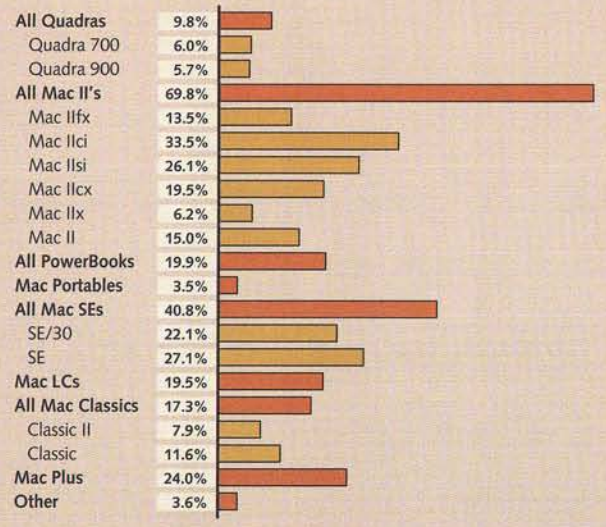
Circle 93 on reader service card

Survey: What Mac Do You Use?

Which Macs do you use at work, home, or elsewhere?



Based on 579 respondents to a 1992 *Macworld* reader survey who use Macs. Multiple responses were allowed.

For BIG Print Jobs

POSTERWORKS is designed for printing graphics as large as 10,000 square feet, such as movie posters, signs, murals, and even billboards, by blowing up a layout and then breaking it down into tiles that print on a wide range of materials and output devices.

Version 3.0 can chop up a layout into tiles of different sizes—useful for trade-show booths and other displays with mixed panel sizes—and can tile automatically based on the layout and the intended output device. Version 3.0 lets you control the gap between separated tiles or the overlap of adjacent tiles with bleeding edges, and a new tool lets you choose two points in an image, scale them, and the whole layout changes to match. PosterWorks 3.0 lists for $395 from S.H. Pierce, 617/395-8350. S.H. Pierce maintains a list of service bureaus that can handle PosterWorks.—D.L.

ERIC MILLETTE

HEALTH FOOD SUPERMARKET WHOLE FOODS USES POSTERWORKS FOR AISLE-HANGERS IN ITS MILL VALLEY, CALIFORNIA, STORE.

BETA WAIT

Long-awaited products

ACIUS'S 4D Server
Shown publicly January 1991. Current ship date projected: after just-announced 4th Dimension 3.0 ships.

FoxPro/Mac
Fox Software discussed publicly winter 1990/91. Microsoft acquired Fox earlier in 1992, and says it will ship FoxPro/Mac "when it's ready."

Interleaf 5
Discussed publicly October 1990. No ship date projected.

Claris's MacWrite Pro
Announced spring 1991. Current ship date projected: end of 1992.

DoWhatDo

DURING THE 1970S, Gordon Pask developed DoWhatDo, an information theory describing how people make conversation and how computers can emulate the process. It became a hot topic at MIT, where video artist Joel Slayton was teaching in the Visible Language Workshop, a precursor to the Media Lab. Now at San Jose State University, Slayton has applied Pask's theory in an October performance titled DoWhatDo. Eleven groups representing Silicon Valley subcultures—from the Indian performers Abahinaya Dance Company and several glittering low-riders to step dancers at an African American fraternity—performed beneath a sculpture containing three Mac screens with nine video channels. Using video discs full of video clips, animation, and graphics related to the performer's art, special software made the videodiscs "converse" about the performers. Slayton's show was sponsored by the San Jose Institute of Contemporary Art, 408/998-4310.
—ANN GARRISON

A MOCK-UP OF THE DOWHATDO STAGE. THE SCAFFOLDING TOOK OVER THE TOP FLOOR OF A SAN JOSE, CALIFORNIA, PARKING LOT.

News

Dayna's NetScope Tracks Network Traffic

Dayna Communications' latest prescription for network headaches is its NetScope Console software and NetScope Probe hardware, designed to ease AppleTalk network management. The portable NetScope Probe hardware attaches to any LocalTalk or Ethernet part of a network that's connected to a router. Once attached, NetScope collects data on transmission errors and traffic.

The NetScope Console software gathers data from one or more NetScope Probes over the network. The Macintosh that runs the software can be anywhere on the net, so the network manager can gather data from the far side of routers. Together the products provide information on broadcasts per second and the use of network resources.

Now shipping, the two products list for $899 together and are also available separately. They also work with Dayna's Network Vital Signs, a fault-monitoring system. All three products bundled list for $1199 under the name Dayna Network Management System. Dayna, 801/531-0600.—T.M.

Portable Drives from Liberty

Liberty Systems has introduced the 20 Series portable external hard drive for PowerBooks, available in 80MB or 120MB versions. The drives have 17ms average access times, according to the company; measure 3 inches by 1¾ inches by 5⅜ inches; and include an internal power supply so there's no need to carry around an additional power brick. The company offers an optional $199 internal battery pack and recharger set.

The 80MB version of the drive lists for $799 and the 120MB version lists for $999. Both are shipping now. Liberty, 408/983-1127.—T.M.

SEAN SULLIVAN

THE 20 SERIES OF PORTABLE HARD DRIVES FROM LIBERTY SYSTEMS HAVE 17MS AVERAGE ACCESS TIMES.

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Specialists in Mac Storage

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Sampo 20" Color.....$1498
- Perfect for DTP & CAD/CAM
- Include Interface cards

Trinitron 19" Color ...$1998

Full Page Display $398

14" Sampo Color.....$398
- Plug compatible with the IIsi, CI, and the LC

14" SONY Trinitron.....$698
- SONY 1304 for the Mac LC, SI, CI and Quadra

16" SONY Trinitron..$1098
- Plug compatible with the Quadra
- Plug compatible with the CI, SI and LC at 640x480

Sigma 19" Trinitron Color 1998.00

Sigma/Sony Trinitron 19" Color System

8 Bit System $1998.00

24 Bit System $2598.00
- The Sigma 19" is a Sony OEM Trinitron, and one of our best buys! True Trinitron color at a great price!
- Includes 8 bit or 24 Bit Video board and cable
- 2 page display supports all Mac IIs', the SI, SE-30, and the LC

Sampo 20"

8 Bit Color System.....$1498.00

24 Bit Color System.....$2298.00

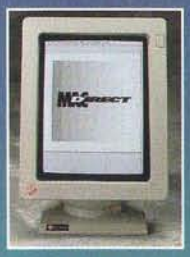
Mono System $598.00

Grey Scale System.....$898.00
- The SAMPO is a high quality dual page display without the high cost!
- Includes 1 bit, 8 or 24 bit Bit Video board and cable
- 2 page display supports all Mac IIs', the SI, SE-30, SE and the LC

NuDesign Full Page Grey Scale $398.00
- Plug compatible with SI, CI and Quadra (16 levels of Grey).
- Available with 1 Bit interface card for all Mac IIs', SE-30, SE and LC $488.00.

* 20" Grey Scale Monitor manufactured by Sampo for Apollo/HP

19" Sigma Trinitron System
- With 8 Bit interface $1998
- With 24 Bit interface $2598



NuDesign Full PageDisplay
- Grey Scale for CI, SI, Quadra....$398
- II, IIfx, FX, SE30, 1Bit $488

20" Sampo Color System
- With 8 Bit interface $1498
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600 & 1200 DPI Color Scanners

Umax UC-630 With *PhotoShop*.....$1148.00

Transparency/Slide Scanner Option.....$798.00

Automatic Document Feeder $498.00
- Rated four mice by MacUser (Dec '91) ▪Rated fastest by MacUser(Dec '91)
- "Boasts the highest vertical resolution..." "Tamarack and Umax produced the best images..." MacUser
- "Tamarack and Umax excel in speed and color accuracy" MacUser

UG-630 With *PhotoShop* Grey Scale Scanner $898.00

Umax UC-1200S With *PhotoShop* $3498.00

Transparency/Slide Scanner Option.....$898.00
- Incredible 1200 dpi scanning res. recognizes 1 billion colors internally
- Single-pass design increases scanning speed
- Includes Adobe Photoshop

Sharp JX-320 With *PhotoShop* $1598.00
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With Photoshop
- Rated 4 Mice by MacUser
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NEW SYSTAT 5.2

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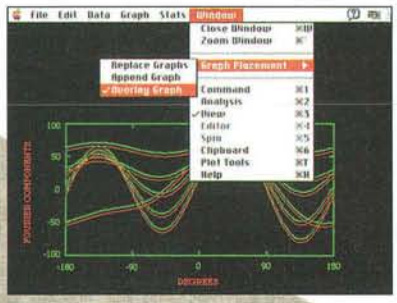
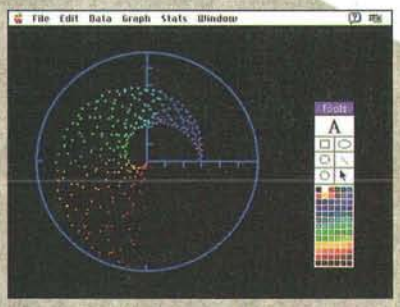
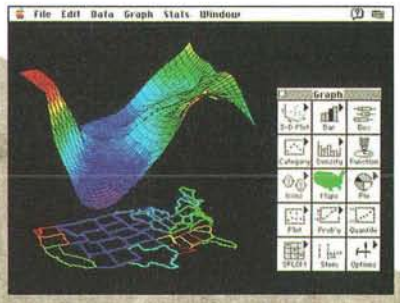
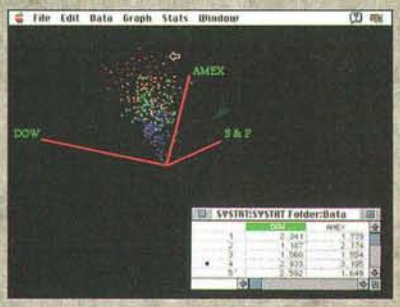
The most comprehensive and powerful statistics software for Macintosh now provides the most advanced multivariate general linear hypothesis program. Yet it remains the easiest to use–with a friendlier-than-ever interface.

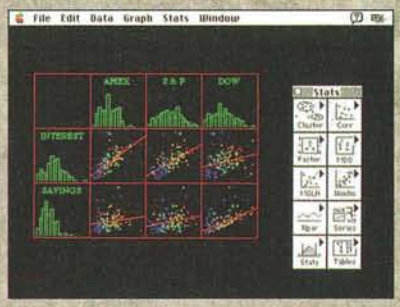
New SYSTAT 5.2 for Macintosh enables you to perform statistical analyses you can't do with any other Macintosh statistics program. It offers more advanced statistical procedures, more types of graphs, and greater data management capabilities.

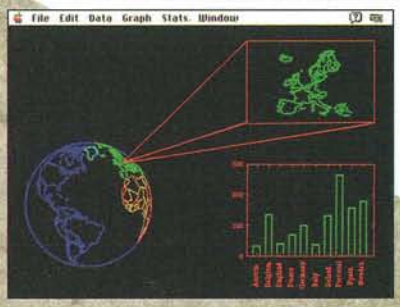












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SYSTAT is truly Mac-like. Just point and click: SYSTAT works with the pull-down menus, dialog boxes, icons, buttons and graphics tools you're accustomed to on the Mac.

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No other statistical or graphics package can produce all the scientific and technical graphs available on SYSTAT–nor surpass its ease of use. And you can save SYSTAT graphics and data in QuickTime™ movie file formats. Graphics options include:

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SYSTAT

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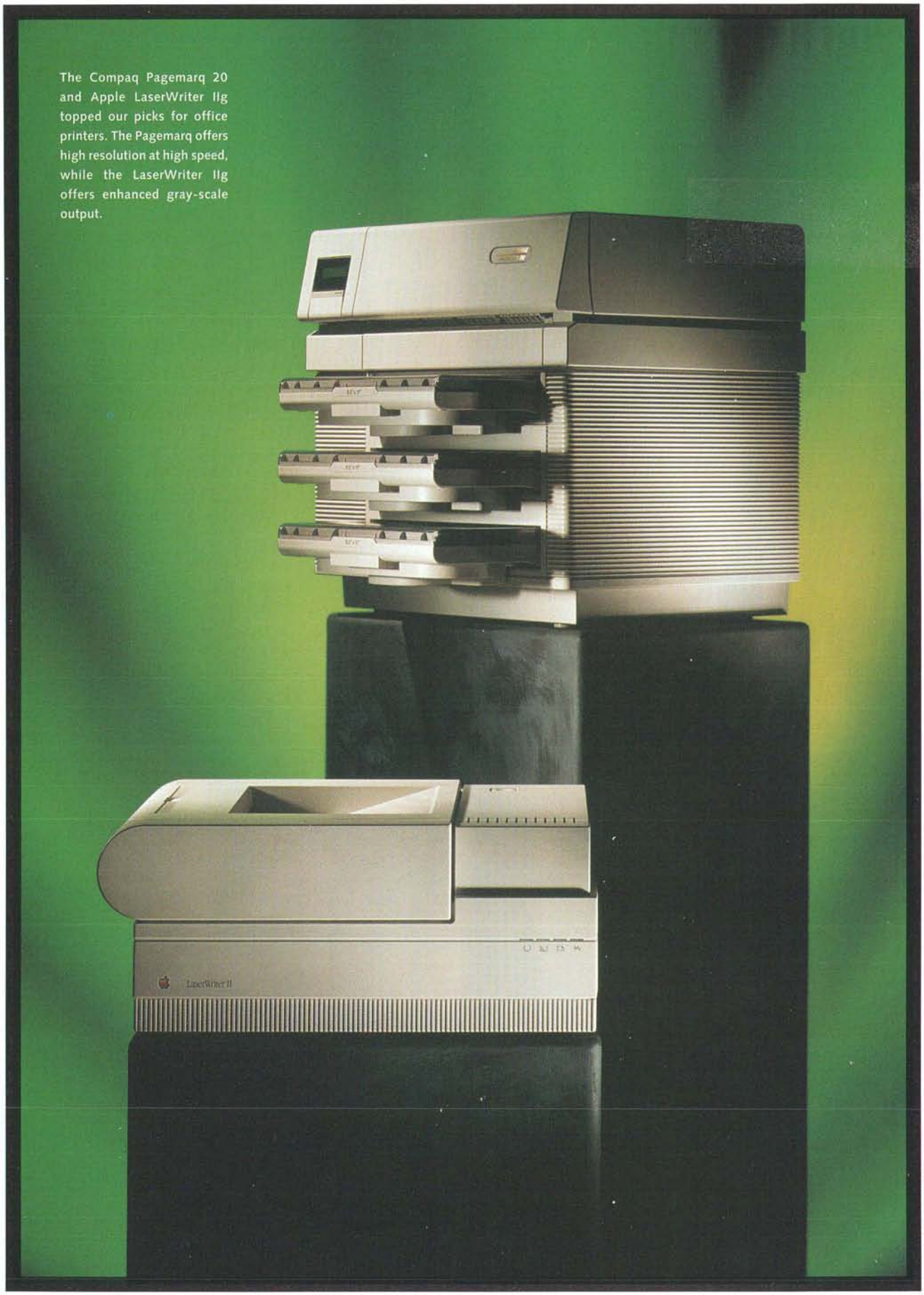


The Compaq Pagemarq 20 and Apple LaserWriter IIg topped our picks for office printers. The Pagemarq offers high resolution at high speed, while the LaserWriter IIg offers enhanced gray-scale output.

PHOTOGRAPHS BY STAN MUSILEK

BY JIM HEID

WORKGROUP PRINTERS

Macworld Lab tests 24 office laser printers, including 2 new trendsetters

PRINTER SPEED AND OUTPUT QUALITY continue to improve as prices fall. So what's new? That happens every year. True, but this year there are some significant improvements, not just the usual enhancements, thanks to three companies that are setting new trends and pushing new limits: Apple, with its PhotoGrade gray-scale enhancement technology; Hewlett-Packard, with its enhanced 600-dots-per-inch output at affordable prices; and believe it or not, Compaq Computer, with its super-fast, high-quality, affordable debut printers. Just three years ago, a high-end printer that produced 400-dpi output and printed 10 pages per minute cost more than $10,000. Today, a 600-dpi printer that produces 17 ppm costs less than $7000. And 600-dpi, 8-ppm printers start at less than $3000.

The printers reviewed here vary in capabilities, but they share a common ground: the workplace. What is the job description for an office printer? To start with, it has to know how to network. All the printers reviewed here provide LocalTalk network ports that let an office full of Macs share the printer. Many printers include or accept optional high-speed Ethernet ports, which can slice printing times for large documents, especially ones with scanned images.

The next requirement is PostScript, the page-description language of publishing. PostScript printers can handle the most graphically complex documents and contain built-in network software. You don't have to equip your network with the print-server software or printer-sharing boxes that are common in the DOS PC and mainframe worlds—simply add network cables and connectors. DOS PCs with LocalTalk expansion boards and software such as Farallon's Computing PhoneNet Talk can join the party, too.

To keep up with the hard-copy demands of an office or workgroup, an office printer should have a print mechanism—an engine—that can print at least 8 ppm. A large or prolific office should consider a 10- or 17-ppm workhorse, or even a Clydesdale like the QMS-PS 3200, which prints 32 ppm (and retails for $19,995).

Some office printers aren't just workhorses, they're also show horses. Some printers use resolution-enhancement techniques that finely control the laser in a 300-dpi engine to simulate higher resolutions. Other printers use true 400- or 600-dpi engines. Still others combine both techniques to simulate resolutions of up to 1200 dpi.

Some of these ultra-sharp printers are billed as plain-paper imagesetters: lower-cost, chemical-free alternatives to photographic imagesetters. We looked at four of them: LaserMaster's $6995 Unity 1000 and $9995 Unity 1200XL (which can produce 11-by-17-inch output) and Printware's $7990 Pro-II and $15,990 Pro-III (also for 11-by-17-inch printing). Although their output quality is excellent, it isn't significantly better than that of a Hewlett-Packard LaserJet 4M or any Canon BX–based 600-dpi printer, like QMS's 860 Print System. Put another way, it isn't thousands of dollars better.

In the Controller's Seat

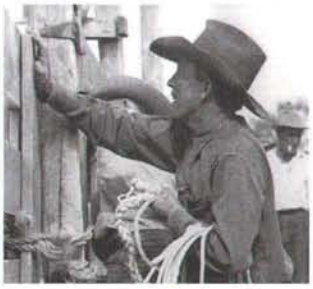
A POSTSCRIPT LASER PRINTER IS HALF electronics and half mechanics, and the past year has brought advancements in both areas. PostScript *controllers*—the logic boards that sit within printers and interpret PostScript commands from the Mac—are becoming faster and more sophisticated. Most PostScript controllers are now built around high-speed RISC (reduced instruction set computer) processors instead of general-purpose 68000-family chips.

RISC-based printers can better handle the calculations required to print documents containing large varieties of fonts and sizes as well as illustrations from programs such as Adobe Illustrator. If your office prints typographically simple documents—manuscripts, legal contracts, memos, correspondence—a RISC-based printer's extra punch may go unused. For these needs, concentrate more on engine speed than controller performance.

More printers are also using PostScript Level 2, an enhanced version of Adobe's PostScript that, in theory, allows faster printing and better support of unique engine features such as multiple paper trays. In practice, the current Apple PostScript printer driver (the LaserWriter file) doesn't take advantage of Level 2's improvements. Apple and Adobe have been collaborating on a Level 2 driver for well over a year, and its scheduled release is uncertain but expected by early 1993. Adobe says that besides allowing access to unique engine features, Level 2 will provide faster performance (even for Level 1 printers) and will bring an end to laser-prep wars—the driver conflict that occurs when a printer is shared among Macs running different system versions.

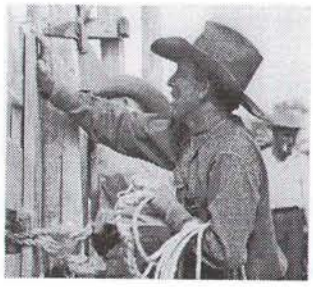
Until the new driver becomes available and proves itself compatible with existing applications (Adobe says its next driver release will be), there's no compelling reason to seek out a Level 2 printer over a Level 1 machine. Instead, look at overall capabilities and performance.

Output Quality Up Close

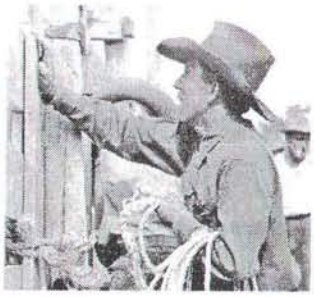


Imagesetter (2540 dpi)

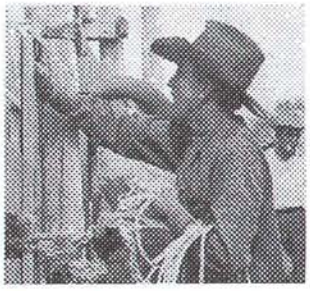
LaserJet 4M (enhanced 600 dpi)



PS 1700 (600 dpi)



LaserWriter IIg (enhanced 300 dpi)



microLaser Plus PS35 (300 dpi)

Gray-Scale Output Resolution greatly affects how well shades of gray are printed. However, Apple's PhotoGrade lets the 300-dpi LaserWriter IIf and IIg printers produce gray-scale output that matches or even beats that of higher-dpi printers. While the Hewlett-Packard LaserJet 4M has resolution enhancement, that enhancement is designed for type, not gray-scale images, so its output matches that of other 600-dpi printers.

Imagesetter (2540 dpi)

LaserJet 4M (enhanced 600 dpi)

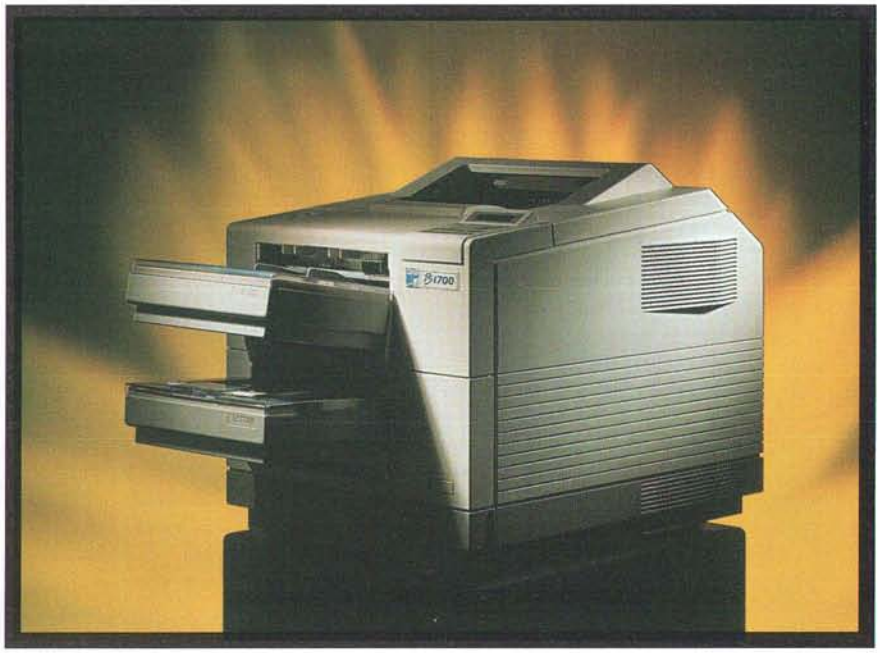
PS 1700 (600 dpi)

LaserWriter IIg (enhanced 300 dpi)

microLaser Plus PS35 (300 dpi)

Typographic Output The Palatino typeface's curves and straight lines accentuate differences caused by a printer's resolution. (The output here is enlarged to 300 percent.) The resolution enhancement in both the LaserJet 4M and LaserWriter IIg make a big difference in the quality of typographic output compared against printers with the same dpi.

And what of PostScript clones—printers with controllers that understand PostScript, but use interpreters created by firms other than Adobe Systems? Among the 300-dpi printers, some of the top performers were clones (see "Rating Printer Performance"). Unlike the batch we tested for September's "Good Buys in Low-Cost Personal Printers," only one clone—Xante's Accel-a-Writer 8000 — had problems printing Adobe's Multiple Master fonts. PostScript clone vendors such as NewGen Systems, LaserMaster, and Xante have established good track records for releasing updates to fix compatibility problems. Of course, you can avoid the problems to begin with by seeking out a true Adobe interpreter.



The QMS PS 1700 (like QMS's PS 3200 and 860 Print System, and Compaq's Pagemarq series) offers all-ports-active connections, which means that several computers (both Mac and DOS) can send print jobs simultaneously to the printer, rather than having each wait for the previous job to complete.

Controller Conveniences

SOME CONTROLLER TRENDS ARE LESS dramatic than the move to RISC chips and PostScript Level 2, but are welcome nonetheless. For example, more printers are offering *emulation-sensing* and *all-ports-active* features that simplify life if you have both Macs and DOS PCs. Emulation sensing lets a printer automatically switch between its native PostScript language and a foreign tongue, such as the Printer Control Language (PCL) used by HP LaserJets and many DOS applications. (In a mixed-platform environment, you appreciate having one printer that speaks both languages.) An all-ports-active feature eliminates having to flick switches to choose which of the printer's ports you want to use. You can, for example, connect your Mac to the printer's LocalTalk port and your DOS PC to its Centronics parallel port. When a print job arrives at one port, the printer temporarily disables the others.

Compaq's new Pagemarq series, as well as QMS's PS 1700 and 860 Print System, take the all-ports-active concept to its limits. These printers can accept multiple print jobs at different ports *simultaneously*—instead of putting one port on hold while another receives a job, all ports can receive jobs at the same time. The printers keep the jobs separate, storing them in memory or in built-in hard drives (available as options for some) until the job that arrived first is printed.

Speaking of hard drives, support for built-in or optional SCSI drives is also becoming more common. Most of the printers profiled in "Surveying Office Printers" include or accept a SCSI drive. A drive can improve performance with typographically complex documents by storing fonts that would otherwise be downloaded from the Mac. Doing away with downloading also reduces a network's traffic, improving performance.

Inside the Engine

LIKE CONTROLLERS, PRINTER ENGINES are getting faster: 9, 10, and 17 ppm are becoming common, even among inexpensive (less than $3000) printers such as Texas Instruments' microLaser Plus PS35 and microLaser Turbo and Dataproducts' LZR 960 and LZR 965 (the LZR-960 is also sold under different names by Hardware That Fits, Mirror Technologies, and Generation Systems). Remember that you'll see this maximum speed only when printing simple documents or multiple copies of the same document. PostScript controllers are faster than ever, but they still can't keep up with the printer's engines on complex jobs.

Paper-handling capabilities are improving, too. Of the printers profiled here, many include or accept a second paper tray, so you can mix and match letterhead and second sheets or envelopes. (Several printers also accept envelope feeders.) Printers from QMS, Hewlett-Packard, and Toshiba include or accept *duplexers* for printing on both sides of a sheet of paper—saving trees while cutting down on paper costs and document-storage requirements.

Printers with extra paper-shuffling skills offer front-panel switches for choosing trays or duplexing options. But who wants to walk across the room to adjust print settings? For tray-selection options to appear in the Print dialog box, printer firms must provide customized versions of the LaserWriter driver or extensions that modify the existing driver during start-up. The extensions that accompany QMS, Compaq, and Dataproducts printers provide the best support for unique engine features (see "Chasing Paper"). One problem, though: If you have two vendors' extensions installed—perhaps your large network contains both QMS and Dataproducts printers—neither extension works.

The forthcoming Apple/Adobe PostScript Level 2 driver will eliminate this problem and allow direct access to unique engine features by supporting PostScript Printer Description (PPD) files, which describe a printer's unique capabilities. Some programs (Aldus PageMaker and FreeHand, for example) have supported PPD files for years, but Apple's printer driver never has. Most current printers include PPD files, so, like the rest of us, they're ready for the new driver.

Laser Wars

THE REAL NEWS IS THE CONTINUING move toward higher resolutions and better output quality (see "Output Quality Up Close"). In previous years, printer vendors played tricks with their engines' lasers to provide higher resolutions. HP's Resolution Enhancement Technology (RET) was first. Apple fired back last year with its FinePrint and PhotoGrade technologies, which improve the appearance of character edges and halftone images, respectively. (HP's RET doesn't improve halftones.) QMS responded with its MR series printers, whose controllers coerce 600-dpi output from 300-dpi engines.

Other companies have developed their own technologies, all of which force an engine to apply smaller dots than it was designed to apply. While such tricks provide resolution that's better than the original, they do not produce the same sharp quality as does an engine designed to produce true 600-dpi output.

HP and QMS have fired the latest salvos in the resolution-enhancement battle, and their weapon is a Canon. Canon —which manufactures print engines for HP, QMS, Apple, and many others—has introduced two new engines that are *designed* to produce true 600 dpi. The new HP LaserJet 4M uses the Canon P-270 engine, whose maximum page size is 8½ by 14 inches. The QMS 860 Print System uses the larger LBP-BX engine, which supports 11-by-17-inch paper. Both can print eight letter-size pages per minute (the LBP-BX prints four 11-by-17-inch pages per minute). Both engines are also available in 400-dpi versions. NewGen Systems has also announced two printers that use the LBP-BX engine: the 600-dpi TurboPS/660B and the 400-dpi TurboPS/440B, which can be upgraded to 800 dpi.

The output from the new Canon engines is not only sharper, it's also cleaner. One classic problem with laser output is that character edges are often slightly fuzzy, surrounded by a haze of stray toner particles. This *toner scatter* occurs because of stray electrical charges generated by a relatively imprecise corona wire, the component that attracts toner from the photoconductive drum to the paper. Toner scatter causes small type to appear heavy and overexposed, with hollow portions of characters such as *b* partially filled in.

In the new engines, Canon has replaced the corona wire with a roller that makes physical contact with the drum, eliminating stray charges and toner scatter. Canon says the new design also reduces the engines' ozone emissions.

Only one printer that uses the new engine design was available for testing—a prerelease model of HP's LaserJet 4M, which uses the smaller P-270 engine. The LaserJet 4M is the heir to the LaserJet throne, and it deserves the crown. Its 600-dpi engine and HP's RET combine to create the best output I've seen from a laser printer. Thanks to a RISC processor and built-in PostScript interpreter, performance is also much improved over the now-discontinued LaserJet III, which used a slow, plug-in PostScript cartridge. The 4M also sports an extremely legible status display, big front-panel switches (not those small, hard-to-press membrane switches many printers use), and paper-handling options galore. It's a terrific printer—with a great print engine that you will undoubtedly see in future printers from other firms.

MW LAB Rating Printer Performance

All times are in seconds. Shorter bars are better. The best performers in each category are highlighted in red. Within each class, products are listed in order of overall performance, from fastest to slowest. Output was tested at each printer's best resolution.

Multiple Fonts — This test highlights typical print speeds in a typical multiple-font document. To test, we used a 7-page Microsoft Word 5.0 document containing a variety of fonts, sizes, and styles.

Courier — This test highlights printer throughput. To test, we used a 20-page Microsoft Word 5.0 document containing double-spaced 12-point Courier text in plain, bold, and italic styles.

MacDraw Pro — This test highlights the speed of printing complicated drawings that don't use many special effects. To test, we used a newspaper graphic containing more than 2000 simple objects and several lines of Helvetica text.

FreeHand 3.1 — This test highlights the speed of printing complex graphics that include special PostScript effects. To test, we used an illustration that includes nonlinear blends and Bézier curves.

PageMaker 4.2 — This test highlights the printing speed of a typical high-end desktop publishing job. To test, we used a 4-page newsletter using several fonts, a MacPaint image, and three gray-scale TIFF images.

	Multiple Fonts	Courier	MacDraw Pro	FreeHand 3.1	PageMaker 4.2
300-dpi Printers					
Compaq Pagemarq 20*	66	89	165	235	60
Texas Instruments microLaser XL Turbo	125	94	128	417	74
Hewlett-Packard LaserJet IIISi	132	95	153	498	49
Apple LaserWriter IIg	157	172	157	335	95
Texas Instruments microLaser Turbo	164	156	137	422	93
Mirror MirrorImage 309	163	167	155	469	103
Dataproducts LZR 960	166	164	156	469	106
Hardware That Fits RealTech Laser	163	165	158	469	107
Apple LaserWriter IIf	171	172	158	549	92
Eastman Kodak EktaPlus 7016 PS	330	107	161	768	104
QMS-PS 815	180	177	198	626	114
GCC Technologies BLP IIS	363	165	260	1314	121
Texas Instruments microLaser XL PS35	469	101	330	1721	433
Texas Instruments microLaser Plus PS35	507	160	341	1732	178
Hewlett-Packard LaserJet IIID	509	189	417	1553	154
Okidata OL 840	784	177	355	1815	150
400-dpi-and-Greater Printers					
Compaq Pagemarq 20 (800 × 400 dpi)	74	93	168	324	58
Dataproducts LZR 1560 (400 dpi)	154	111	150	496	83
LaserMaster Unity 1000 (1000 dpi)	151	172	156	365	99
NewGen TurboPS/630 (600 × 300 dpi)	115	170	155	420	120
NewGen TurboPS/840e (800 × 400 dpi)	145	175	155	520	94
QMS-PS 1700 (600 dpi)	186	274	157	466	88
NewGen TurboPS/880 (800 dpi)	152	179	158	690	117
QMS-PS 815MR (600 dpi)	261	192	229	901	166
Xante Accel-a-Writer II (600 dpi)**	224	292	214	833	182
Xante Accel-a-Writer 8000 (600 dpi)	229	303	311	851	185
Lexmark IBM 4029A (600 dpi)	475	268	265	1423	126

*Because this 800-by-400-dpi printer can also be set to 300 dpi, we tested it at both resolutions. **Upgrade board, tested in an Apple LaserWriter IIf.

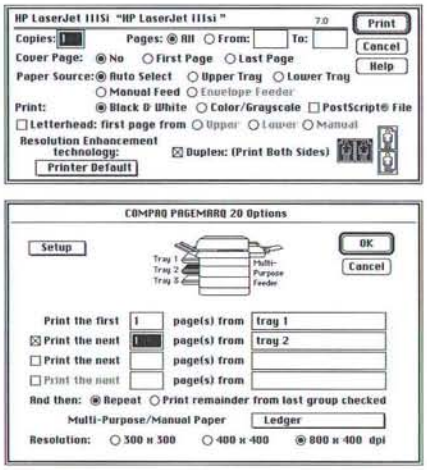
Compaq Makes Its Marq

CANON ISN'T THE ONLY ENGINE MANUfacturer doing exciting new things. Fuji and Xerox's joint Japanese subsidiary, Fuji Xerox, has developed an engine design that's used in several of the printers reviewed here, including the Dataproducts LZR 1560 (and the versions of it sold by Hardware That Fits, Mirror Technologies, and Generation Systems) as well as Compaq's new Pagemarq 15 and Pagemarq 20. The Pagemarqs mark the venerable DOS PC vendor's entrée into the printer business, for both DOS and Mac users.

The Fuji Xerox engine produces 300-dpi or 400-dpi output at a maximum speed of 15 ppm. (The Compaq Pagemarq 20 uses a 20-ppm version.) Output quality is excellent, although not as sharp or clean as the LaserJet 4M's. You can select the desired resolution from the Print dialog box or by using front-panel switches. As with all printers with switchable resolutions, performance is better in 300-dpi mode, since the controller has fewer dots to generate. The engine can print pages as large as 11 by 17 inches—impressive for a package that's smaller than an HP LaserJet IIISi, which is limited to legal-size paper.

The initial models of the Dataproducts LZR 1560 (and the versions of it sold by Hardware That Fits) have a problem with ragged-looking type in their 300-dpi modes. A Dataproducts representative said the problem is caused by noise in the engine's circuitry; a free fix is available. (If you want to wield a soldering iron at the likely expense of your warranty, you can fix it yourself. Remove capacitor C-66, located next to the printer's raster video connector.) In current models the problem has been fixed.

The new LaserJet 4M from Hewlett-Packard combines high resolution (600 dpi) with resolution enhancement technology that lets its typographic output rival that of some imagesetters.



Chasing Paper Printers that provide multiple paper trays usually include software that lets you choose trays using the Print dialog box. The paper-handling software for Hewlett-Packard's LaserJet IIISi (top) isn't as flexible as that which accompanies Compaq's Pagemarq series, QMS's PS 1700, or Dataproducts' printers, all of which use a similar extension to provide the options shown at bottom.

The Dataproducts LZR 1560 is a solid performer, but it pales next to the new Compaq Pagemarq series. The Compaq Pagemarq 20 had the best overall times of any printer reviewed here. It wasn't just the 20-ppm engine that made the difference; the printer also finished first in the FreeHand test and was speedy in the MacDraw Pro test, both of which use one-page documents—where raw throughput speed is not a factor but complex graphics processing is. Compaq has also added an enhanced-resolution mode that doubles horizontal resolution to 800 dpi, producing finer dots by using on its 400-dpi engines the same tricks that other vendors use for printers that produce 600-dpi output from 300-dpi engines. The printers are also the first to incorporate Adobe's own emulation-sensing technology, called IntelliSelect, which is billed (at least by Adobe) as a standard for emulation switching.

The Pagemarq 15 includes two paper trays, and the Pagemarq 20 includes three. The Fuji Xerox engine's standard paper trays hold just 250 sheets. That's on the skimpy side for a fast engine—the deep trays that accompany QMS's PS 1700 and HP's LaserJet IIISi hold 500 sheets. To improve paper capacity without using deeper trays (which would have required a redesigned engine), Compaq developed a unique tray design called the TwinTray, in which two 250-sheet stacks of paper sit alongside each other. When one stack is spent, a motorized mechanism inside the tray slides the second stack into position. It works, but changing stacks takes several seconds. And like Mom used to say at Christmas, it's just something else to break. (Indeed, one TwinTray arrived at *Macworld* broken.) A TwinTray also costs $20 more than a standard 250-sheet tray. The Pagemarq 20 includes three TwinTrays, while the Pagemarq 15 includes one TwinTray and one 250-sheet tray. A second TwinTray is optional.

What may be most impressive about the Pagemarq series is the array of options: a 60MB internal hard drive; 1MB or 2MB font modules that, like a hard drive, can hold downloadable fonts; and best of all, a fax-modem board that turns the printer into a plain-paper fax that can receive faxes even as it handles incoming print jobs. Software is included that lets you send faxes from a DOS PC or Macintosh. Although built-in faxing is not unique to the Pagemarq, its fax-modem board is the first to use Adobe's PostScript fax technology—if you send a document from another PostScript fax, it prints at maximum resolution using the Pagemarq's resident fonts. (Think of it as remote printing by phone.) You can expect other vendors to follow suit.

What to Buy, What to Avoid

THE HP LASERJET 4M AND COMPAQ PAGEmarq series set new standards in their classes. They're the top picks in terms of quality and speed, respectively, and both companies offer good pricing. Still, other printers are worth considering.

If you want top halftone quality from gray-scale scanned images, look at Apple's LaserWriter IIg, which finished fourth in overall performance. Its 8-ppm Canon SX engine is yesterday's news, but its PhotoGrade-enhanced gray-scale output remains hard to beat. Text quality is excellent, too, and the printer includes Ethernet and SCSI connectors. The less-expensive LaserWriter IIf is slower and lacks Ethernet, but it also provides FinePrint and, if you upgrade its memory to 5MB, PhotoGrade.

For heavy-duty office use, HP's $6995 LaserJet IIISi still shines, as does Dataproducts' $3395 LZR 1560 (and the version sold by Hardware That Fits). QMS's 600-dpi PS 1700 provides good performance, optional duplex printing, and simultaneously active interfaces. The $6995 PS 1700 contains the QMS Crown printer operating system, which gives you more control over printer memory and other internal settings than other PostScript printers.

With its unenhanced 300-dpi output, Texas Instruments' microLaser series is showing its age, but remains noteworthy for its upgradability. You can start out with the 6-ppm $2399 microLaser XL,

SURVEYING OFFICE PRINTERS

Company	Product	Tested by Macworld Lab	List Price	Maximum Engine Speed (in ppm)	Best Resolution (in dpi)	PostScript Level	Contains TrueType Rasterizer	RAM (base model/ maximum)	All Ports Activ Emulation Switching
Apple Computer	LaserWriter IIf	●	$3299	8	300 × 300[1]	2	●	4MB/32MB	●/○
	LaserWriter IIg	●	$4299	8	300 × 300[1]	2	●	8MB/32MB	●/○
Compaq Computer	Pagemarq 15	○	$4199	15	800 × 400[1]	2	○	4MB/18MB	●/●
	Pagemarq 20	●	$5699	20	800 × 400[1]	2	○	4MB/20MB	●/●
Dataproducts	LZR 1560	●	$3395	15	400 × 400	2	○	4MB/16MB	●/○
	LZR 960	●	$2195	9	300 × 300	2	○	2MB /10MB	●/○
	LZR 965	○	$2995	9	600 × 600	2	○	8MB/16MB	●/○
Eastman Kodak	EktaPlus 7016 PS	●	$5795	16	300 × 300	1	○	2MB/4MB	●/○
GCC Technologies	BLP IIS	●	$2099	8	300 × 300	1	○	2MB/4MB	○/○
	BLP Elite 8	○	$1699	8	300 × 300	1	○	2MB/4MB	○/○
Generation Systems	Laser 309	○	$3295	9	300 × 300	2	○	2MB/10MB	●/○
Hardware That Fits	RealTech Laser	●	$1695	9	300 × 300	2	○	2MB/10MB	●/○
	RealTech Laser 400	○	$3195	16	400 × 400	2	○	4MB /16MB	●/○
Hewlett-Packard	LaserJet IIID	●	$4895	8	300 × 300[1]	2	○	5MB/5MB	○/●
	LaserJet IIISi	●	$6995	17	300 × 300[1]	1	○	5MB/17MB	○/●
	LaserJet 4M	○	$2999	8	600 × 300[1]	2	●	6MB/26MB	●/●
Kyocera Electronics	Ecosys FS-1500a	○	$2983	10	300 × 300[1]	1[4]	○	1MB/5MB	●/○
LaserMaster	Unity 1000	●	$6995	8	1000 × 1000[1]	1[4]	●	9MB/48MB	●/●
	Unity 1200XL	○	$9995	8	1200 × 1200[1]	1[4]	●	21MB/48MB	●/●
Lexmark International	IBM 4029A	●	$3995	10	600 × 600[1]	1	○	5MB/9MB	○/○
Mirror Technologies	MirrorImage 309	●	$1699	9	300 × 300	2	○	2MB/10MB	●/○
NEC Technologies	Silentwriter2 990	○	$2999	8	300 × 300	1	○	2MB/4MB	○/●
NewGen Systems	TurboPS/440B	○	$4495	8	400 × 400[1,9]	1[4]	●	6MB/96MB	●/●
	TurboPS/440N	○	$5995	17	400 × 400[9]	1[4]	○	8MB/96MB	●/●
	TurboPS/440ND	○	$6595	17	400 × 400[9]	1[4]	○	12MB/96MB	●/●
	TurboPS/630	○	$2995	8	600 × 300[1]	1[4]	○	4MB/32MB	●/●
	TurboPS/630EN	○	$3595	8	600 × 300[1]	1[4]	○	6MB/32MB	●/●
	TurboPS/660	○	$3495	8	600 × 600[1]	1[4]	○	6MB/32MB	●/●
	TurboPS/660B	○	$4995	8	600 × 600[1]	1[4]	●	12MB/96MB	●/●
	TurboPS/840e	●	$3995	8	800 × 400[1]	1[4]	○	6MB/32MB	●/●
	TurboPS/880	●	$4795	8	800 × 800[1]	1[4]	○	12MB/32MB	●/●
Okidata	OL 840	●	$2599	8	300 × 300	1	○	2MB/4MB	○/●
Printware	Pro-II	○	$7990	8	1200 × 600	1[4]	○	4MB/16MB	●/○
	Pro-III	○	$15,990	12	1200 × 600	1[4]	○	12MB/32MB	●/○
QMS	860 Print System	○	$4595	8	600 × 600	1, 2[4]	○	12MB/32MB	●/●
	PS 815	●	$3295	8	300 × 300	1	○	2MB/8MB	●/●
	PS 815MR	○	$3995	8	600 × 600	1	○	6MB/8MB	●/●
	PS 825	○	$3995	8	300 × 300	1	○	2MB/8MB	●/●
	PS 825MR	○	$6495	8	600 × 600	1	○	6MB/8MB	●/●
	PS 1700	●	$6995	17	600 × 600	1	○	8MB/32MB	●/●
Qume	CrystalPrint Express	○	$3495	12	600 × 300	1[4]	○	3MB/8MB	○/●
Texas Instruments	microLaser Plus PS35	●	$1499	9	300 × 300	1	○	0.5MB/4.5MB	○/○
	microLaser Turbo	●	$1749	9	300 × 300	2	○	2.5MB/10.5MB	●/●
	microLaser XL PS35	●	$3149	16	300 × 300	1	○	0.5MB/4.5MB	○/○
	microLaser XL Turbo	●	$3649	16	300 × 300	2	○	2.5MB/10.5MB	●/●
Toshiba America	PageLaser 6X400	○	$5499	17	300 × 300[1]	1[4]	●	1MB/9MB	○/●
Xante	Accel-a-Writer 8000	●	$3295	8	600 × 600	1[4]	○	8MB/16MB	●/●

● = yes; ○ = no. [1] Has resolution enhancement. [2] Company does not provide support. [3] Available as option. [4] Uses PostScript emulation instead of Adobe Systems interpreter. not disposed of. [8] Not available for testing. [9] Higher resolution available as optional purchase. [10] 40MB internal hard drive included. [11] Through Canon.

and upgrade to the 9-ppm microLaser XL Turbo, which finished close behind the Compaq Pagemarq 20 (when set at 300 dpi) in most tests and beat it in one.

If you want to give new life to an old Canon CX– or SX–based LaserWriter or LaserJet, investigate Xante's Accel-a-Writer series of RISC-based controller upgrade boards, which also boost resolution to 600 dpi. But Xante's first complete printer, the 600-dpi Xante Accel-a-Writer 8000, finished last or close to last in our tests.

One printer to avoid is Toshiba's PageLaser 6X400 model. Besides having a confounding configuration of paper-handling options (some of which we never did get to work, preventing complete testing), this printer has the most difficult front-panel menu system I've seen. Look instead to HP or QMS for a 17-ppm duplex printer. Likewise, the 600-dpi IBM 4029A from Lexmark International (which took over IBM's printer business) produces sharp output, but it's slow.

Eastman Kodak's EktaPlus 7016 PS is an odd bird. Its controller is a tortoise, but thanks to a 16-ppm engine, the printer finished fifth in the Courier test. The EktaPlus 7016 PS is also a 6-ppm photocopier. If you print simple documents, it could be a versatile alternative.

In the end, the big newsmakers this time around are the new Canon engines, HP's latest LaserJet, and Compaq's new contenders. Beyond that, RISC chips and resolutions are on the rise as prices fall. Between these welcome trends and the newest entries to the market, there hasn't been a better time to get down to the business of printing. **m**

See *Where to Buy* for contact information.

SCSI Port for Font Hard Drive	Standard Paper-Tray Capacity (in sheets)	Toner-Cartridge Life (in pages)	Recycling Program for Consumables	Technical-Support Rating
●	200	4000	●	[2]
●	200	4000	●	[2]
○ [3]	750	12,000	●	satisfactory
○ [3]	1500	12,000	●	satisfactory
●	250	12,000	●	good
●	250	3000	●	good
●	250	3000	●	good
○	500	4000	○	very good
●	200	15,000	○	excellent
○	200	15,000	○	excellent
●	250	3000	○	[2]
●	250	2000	○	very good
●	250	11,000	○	excellent
○	400	4000	●	excellent
○	1000	8000	●	excellent
○	350	6000	●	excellent
○ [5]	250 [6]	5000 [7]	○	[8]
○ [3]	200	3000	○	excellent
●	250	5000 [7]	○	excellent
○	700	9500	●	excellent
●	250	3000	○	good
●	200	4000	○	[8]
●	250	6000	○	very good
●	500	8000	○	very good
●	500	8000	○	very good
●	200	4000	○	very good
●	200	4000	○	very good
●	200	4000	○	very good
●	200	6000	○	very good
●	200	4000	○	very good
●	200	4000	○	very good
○	200	2500	○	unsatisfactory
● [10]	250	5000 [7]	○	[8]
● [10]	250	5000	○	[8]
●	250	6000	● [11]	very good
○	200	4000	○	very good
○	200	4000	○	very good
○	400	4000	● [11]	very good
○	400	4000	● [11]	very good
●	500	8000	● [11]	very good
○	250	3000	●	[8]
○	250	3000	○	good
●	250	3000	○	good
○	250	6000	○	good
●	250	6000	○	good
○	500	13,000	●	[8]
●	200	4000	○	excellent

[5] Supports PCMCIA-format font cartridges. [6] Plus 70 envelopes. [7] Only toner needs replacement; cartridge is

MW EDITORS' CHOICE

High-Speed Printing

Pagemarq 20 The Pagemarq 20's 1500-sheet paper capacity (ledger-size paper, at that), 20-ppm engine, and performance-tuned RISC controller combine to create a superb network printer. Its output quality isn't as sharp or clean as that of the Hewlett-Packard LaserJet 4M, but it's excellent nonetheless. **Company:** Compaq Computer Corporation. **List price:** $5699.

Duplex Printing

LaserJet IIISi The LaserJet IIISi remains a top performer—the fastest printer we tested that supports duplex printing. Plus it offers enhanced-resolution technology for its 300-dpi output. **Company:** Hewlett-Packard. **List price:** $6995.

Basic Printing

microLaser XL Turbo Offering unenhanced 300-dpi output, the microLaser XL Turbo isn't the printer to buy if you want camera-ready copy. But you get a lot for the price: a 16-ppm engine with two paper trays, PostScript Level 2, and one of the fastest RISC-based controllers we've tested. **Company:** Texas Instruments. **List price:** $3649.

Contributing editor and *Getting Started* columnist JIM HEID has worked with nearly 100 laser printers since Hewlett-Packard's LaserJet was introduced in 1984. His latest book, coauthored with Peter Norton, is a second edition of *Inside the Apple Macintosh* (Brady, 1992).

Macworld Lab testing supervised by DANNY LEE.

PICKING THE BEST VIDEO-CAPTURE BOARDS FOR MAKING QUICKTIME MOVIES

The Full-Motion

BY CARY LU

If you're ready to try your hand at making QuickTime movies or other video presentations, the first step is to get full-motion video—the kind we watch on television—into the Macintosh.

Fortunately, the process is pretty easy. With a full-motion video-capture board installed in the Mac, simply plug in the video source—video camera, VCR, laser-disc player, or TV tuner. The board converts the analog video—in sequence—into digital information the computer can understand, then stores the data on the Mac's hard drive. All you have to do is edit the material into a presentation or movie—but that's another story (see "QuickTime—Your First Time," *Macworld*, October 1992, to find out how to make a Mac movie).

Unfortunately, accommodating the demands that full-motion video makes on your computer isn't so simple. Besides the video-capture board, you may need to buy a speedier Mac and add a larger, faster hard drive. And after that, you'll probably want to upgrade or replace your video-capture board—it's a new technology that's changing constantly.

To help you become a Mac movie mogul, I evaluated 10 full-motion NuBus video-capture boards—SuperMac Technology's VideoSpigot NuBus, Workstation Technologies' WTI-Moonraker, Radius's VideoVision, and

Macintosh

JOHN HERSEY

RasterOps' MediaTime and its variations. There are other video-capture boards on the market, but I focused on these because they are able to continually store a stream of moving images to a hard drive, up to the capacity of that drive—some products store directly to RAM, which is just too limiting. In addition, I weeded out products that couldn't capture more than 5 frames per second (more on frame rates later). Both capabilities are vital to anyone making QuickTime movies or other video presentations.

While all of the boards evaluated in this article support single-frame capture, I looked at their full-motion capture capabilities only. And keeping in mind that many potential QuickTime moviemakers aren't full-time video professionals with lots of money to spend on equipment, I concentrated on video-capture boards that cost $3500 or less.

Not all video digitizers capture full-motion, real-time video

What's the Difference?

IT'S IMPORTANT TO NOTE THAT NOT ALL PRODUCTS commonly referred to as video-capture boards or video digitizers are capable of capturing full-motion, real-time video. The simplest (and least expensive) video digitizers—such as Koala Acquisitions' MacVision (which lists for $499 for gray-scale and $799 for color, but is usually discounted heavily)—take several seconds to digitize an image. As a result, they're only able to digitize static images from video (a freeze frame from a paused videotape, for example).

Video frame grabbers, such as Digital Vision's ComputerEyes Pro ($399.95) and ComputerEyes RT ($599.95), are fast enough to capture a still image from a motion sequence; you don't have to hit the pause button on a VCR or laser disc. Although they grab quickly, they take a second or more to write the frame to disk, so they can't cope with a full-motion sequence.

Then there are the true video-capture boards that digitize continuous, full-motion image sequences; these boards are essential for anyone planning to make a QuickTime movie or any type of multimedia presentation that incorporates live-action video.

Do You Need One?

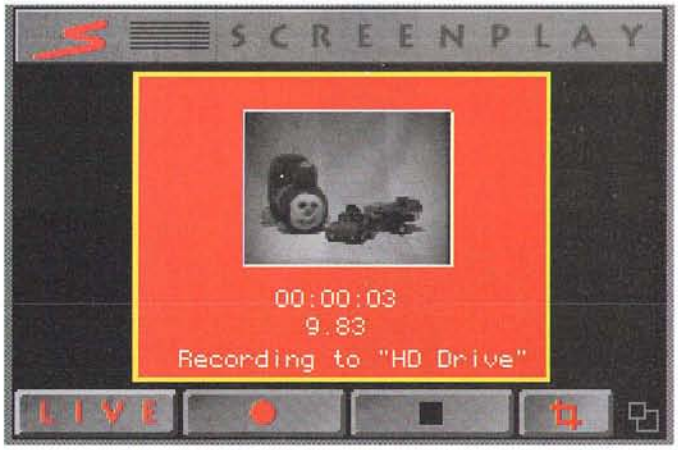
JUST BECAUSE YOU'RE PLANNING A VIDEO EXTRAVaganza on your Mac doesn't necessarily mean you're a candidate for a video-capture board.

Keep in mind that full-motion video movies on a Mac are usually viewed within a small QuickTime window (160 by 120 pixels, or 320 by 240 pixels with QuickTime 1.5), due to the enormous demands a full-screen, full-motion video makes on your Mac. In addition, the motion of a QuickTime movie typically isn't smooth, and on anything less than a Mac IIfx or Quadra, it is downright jerky.

motion, real-time video

Even if you're planning to create professional video productions for broadcast or distribution on videotape, you can still benefit from QuickTime and a video-capture board. You can capture the video sequences and then storyboard and edit to your heart's content in a QuickTime-editing program (such as Adobe Premiere) without worrying about the costly charges of a professional editing suite. When you're done, you can take an edit-decision list to a production house and have a finished tape assembled that meets broadcast standards.

But if you can't live with a small movie window, or if you don't have the money or resources to have a production house finish the job, you're better off bypassing the Mac in favor of conventional video editing—two or three editing VCRs and an editing controller. For casual video editing, a camcorder, and a consumer VCR with flying erase heads may be all the hardware you need to make an effective tape.



Size and Speed ScreenPlay (shown at left), a proprietary video-capture program for SuperMac's Spigot boards, displays a small monochrome image of the video you're recording. Because it doesn't display the video in full-size color, ScreenPlay enables the Spigot boards to capture video at top speeds. By contrast, the other capture boards display a color image at normal size during recording. At right is the recording window in MovieRecorder, part of Apple's QuickTime Starter Kit.

Frame Rates

THE MOST IMPORTANT CRITERION FOR EVALUATING a video-capture board is its frame rate (frames per second, or fps), which measures how quickly (or slowly) the board digitizes full-motion video.

The fundamental problem desktop video must cope with is the huge flood of data generated by video movies. A single 640-by-480-pixel color image equals about 1MB of data. At the standard North American television video rate of 30 fps, a video movie generates 30MB each second. That's 10 to 40 times the data-transfer rate current desktop Macs can write continuously to a hard drive. Recording sound adds another 25K to 180K to each frame, depending on compression and whether the sound is mono or stereo (see "Compression and Quality").

To stem this data tide into a manageable stream, there are three simple strategies:

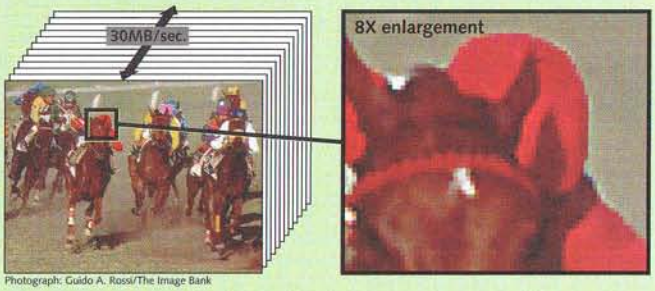
First, reduce the frame rate. While 30 fps is standard for North American television, a much lower frame rate—about 12 fps—is common for QuickTime movies. Most Mac models simply can't pull data out of the hard drive any faster. Here the tiny QuickTime movie window helps; a 12-fps movie that would look jerky blown up to the full size of the screen looks more acceptable in a tiny window.

Second, digitize fewer pixels for your video movie, which generates a smaller or coarser picture; fewer pixels means less data each second and fewer demands on your computer. The standard small QuickTime movie window, for example, is about one-sixteenth the area of a standard 640-by-480-pixel screen.

Third, minimize the number of colors captured. The capture boards can produce 16-bit color (thousands of colors) faster than 24-bit color (millions of colors), and the result looks almost as good. The speed penalty for 24-bit color can be as high as 25

Compression and Quality

Full-motion, full-screen, full-color video (at right) needs 30MB of storage space per second of video to run on a Mac—far more data than a Mac can manage without assistance. There are two ways to help the Mac process this data flood: QuickTime compression (below, left) and JPEG (Joint Photographic Experts Group) compression (below, right). Both methods create some compromises in image quality.



Photograph: Guido A. Rossi/The Image Bank

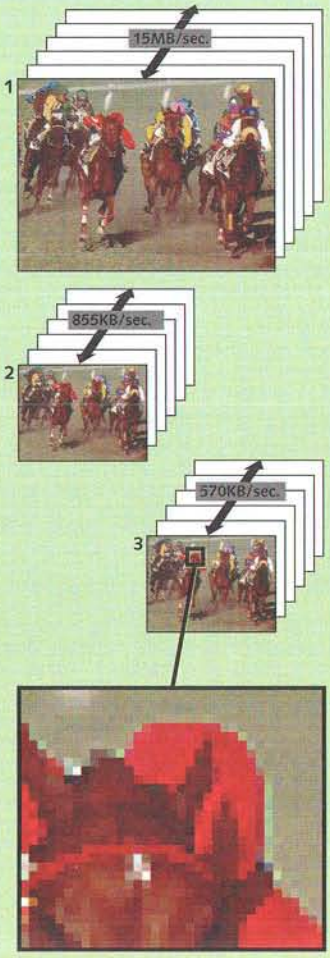
QuickTime Compression

If you don't have access to a JPEG hardware compression board, you can squeeze video into the Mac by taking the following steps in software:

1) Reduce the frame rate. Eliminating every other frame reduces a video of 30 frames per second (fps) to a more manageable 15 fps. For a small QuickTime window, 12 to 15 fps is the standard frame rate.

2) Drop pixels. The standard Mac display screen contains 640 by 480 pixels; a QuickTime 1.0 window is 160 by 120 pixels. Digitizing fewer pixels creates a smaller, coarser QuickTime image, but the video file is one-sixteenth the size of the original file.

3) Drop colors. Capturing video in 24-bit color and then converting it to 16-bit makes for a smaller image file. The resulting 16-bit images look almost as good as they do in 24-bit color.



After video capture, you can further reduce the file size using QuickTime compression. The result: a video file that would have been 30MB per second is squeezed into as little as 80KB per second. When comparing the enlarged image detail here with the detail of the original image (at top,far right), you can see the loss of resolution that has occurred. For a small QuickTime window, though, the quality is acceptable.

JPEG Compression

Hardware compression boards are the only way to capture full-motion, full-screen video on a Mac. These boards use JPEG compression, which compresses and decompresses video frames in real time by taking the following steps:

1) Separate the image. JPEG separates an image's RGB information into three components: luminance, or light intensity (front); and two chrominance components (back), shown combined, which contain the color data.

2) Discard and compress. For compression purposes, JPEG divides an image into 8-by-8-pixel blocks. The JPEG algorithm looks at color values in each block, discards some color data, then averages the remaining color information to decrease the file's size.

3) Decompress and play back. To cut the space required to store this video, the file size was compressed using a 36:1 ratio. The file is decompressed to its original size for playback.

Compared with the QuickTime image enlargement at far left, the JPEG-compressed image quality has a finer resolution, but still doesn't offer the same resolution quality as the original image (detail at top, far right).

percent. Don't go too low, though; 8-bit color (256 colors) tends to be too splotchy for regular use.

Using these methods, you get a video data-transfer rate of roughly 600 kilobytes per second for a 12-fps video movie in a 160-by-120-pixel window or 625 KBps with sound. On a midrange Macintosh—a IIsi or IIci—625 KBps is close to the limit that a typical hard drive can manage, and a one-minute video movie takes up 37.5MB. Faster Macs do much better; Quadras can usually record and play back 30 fps for smooth motion, and a one-minute movie takes up 94MB. In addition to sporting a much faster processor, the Quadras also have a faster SCSI interface to hard drives.

You're better off capturing video without software compression

Beyond the simple expedients of window size and frame rate lies the realm of data compression. Compression recodes the pixel-by-pixel information with a kind of shorthand, reducing the overall data rate to a small fraction of the raw data rate (for more on this subject, see "Image Compression Matures," *Macworld*, March 1992).

Software compression, the kind built into QuickTime, saves space on the hard drive but doesn't help much during the video-capture process. Applying software compression while recording video actually slows down the frame rate because the Mac's CPU has to perform the compression instead of simply shoveling bits onto the drive. You're better off capturing without software compression and applying it afterward to reduce the file size.

Hardware compression boards produce fast, efficient video compression without taxing the CPU. They compress the video during the capture process and are the only way to digitize full-screen, full-motion video on the Mac. They're also expensive: Digital F/X, Avid Technology, and SuperMac all have video-capture boards with JPEG (Joint Photographic Experts Group) hardware compression with prices beginning at $6000.

Only the fastest Macs—the Mac IIfx and the Quadras—have the data-transfer rates and storage resources to capture 30 fps of video without compression hardware. If you view a 30-fps video on a IIfx or Quadra, you see fairly accurate real-time motion. If you have a fast Mac, consider recording your video movie at the standard QuickTime rate of 12 to 15 fps, particularly if it's intended for viewing on anything less than a Mac IIfx. On a slower Mac, setting 12 fps for capture can produce smoother results than setting 30 fps, if the system isn't capable of capturing that fast. Pushed to the max, the input and output buffers in the video-capture board get out of sync—at times the board captures two frames in a row and then has to wait several frames before data is cleared out for a new frame. Slower but steadier timing works more consistently.

Display Adapters

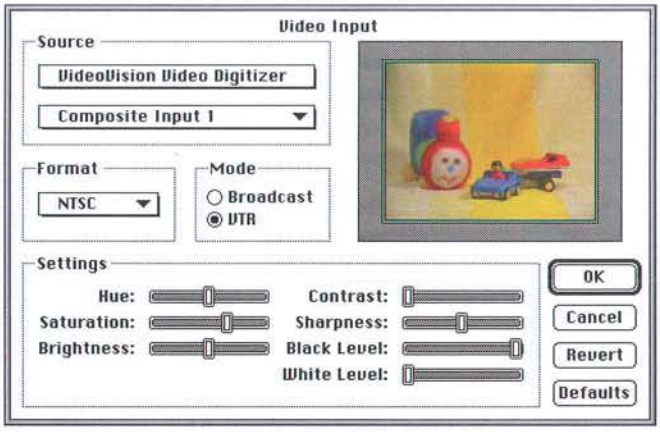
ANOTHER CONSIDERATION WHEN CHOOSING BETWEEN capture boards is the ability—or lack thereof—to display the video.

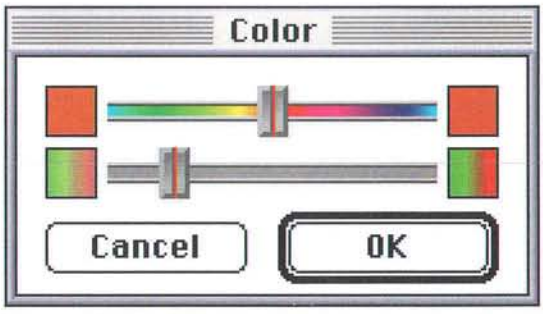
The lowest-price full-motion video-capture boards such as the SuperMac VideoSpigot ($449) only capture video; to display the images, they rely on a separate video-display adapter or a Mac's built-in video circuits. Other boards (SuperMac's VideoSpigot Pro and Radius's VideoVision, for example) include a video-display adapter for several sizes of Mac screens or for one particular size display (see "Video-Capture Board Details").

Video-display adapters that include hardware *pan and zoom* can magnify small QuickTime windows. Pan and zoom magnifies any portion of the screen by "enlarging" the pixels (each QuickTime pixel becomes a 4-pixel "dot" in the enlarged window). While it doesn't provide any more visual data, pan and zoom makes the QuickTime window four times as large, which is often easier to watch.

Video Output

MOST VIDEO-CAPTURE BOARDS CAN'T SEND A VIDEO signal to a VCR or television monitor. In some cases, the board can export monochrome video through an optional cable assembly that replaces the usual video cable between the video-display adapter and the monitor. For color, you need to add a Mac RGB video-to-NTSC (or PAL or SECAM) converter, which costs $350 to $600 and is available from the capture-board vendors or from third parties. (PAL is the broadcast TV standard for most of western





Getting Control Image-adjustment capabilities vary between video-capture board software programs. SuperMac's ScreenPlay capture utility (at right) offers only minimal control. MovieRecorder (at left), which the VideoVision and WTI-Moonraker boards use for capture, gives you much more flexibility. RasterOps' MediaGrabber program offers, in two windows (shown at bottom of facing page), comprehensive color (at right) and video (at left) controls.

Europe; SECAM is the broadcast standard in France and eastern Europe; NTSC is the TV standard for North America, Japan, and Taiwan. All the boards here support NTSC and PAL; only the RasterOps boards support SECAM, however.)

The video output consists of the entire Mac screen, complete with title bar and windows; a typical QuickTime movie will be only a fraction of that image.

Radius's VideoVision comes with color video output built-in. For computer-generated images, including the Mac desktop, the VideoVision produces exceptionally stable NTSC and PAL video output. This is quite an accomplishment; a computer image typically flickers severely when translated to video. That's because a television signal is *interlaced*, meaning a frame is split into two fields—one containing all the even-numbered lines, another with all the odd-numbered lines. The two fields are transmitted alternately and your eye sees the images as interlaced together on the TV screen. A 1-pixel-high horizontal line (such as the top of a window border in an application file) appears only in every other field, causing that line to flicker noticeably.

Radius gets around this problem through *convolution*, an Apple-developed technique to suppress flickering. Convolution does blur the image slightly, however, and it isn't usually necessary or helpful for live-action images; but you can turn it off.

The Right Connections

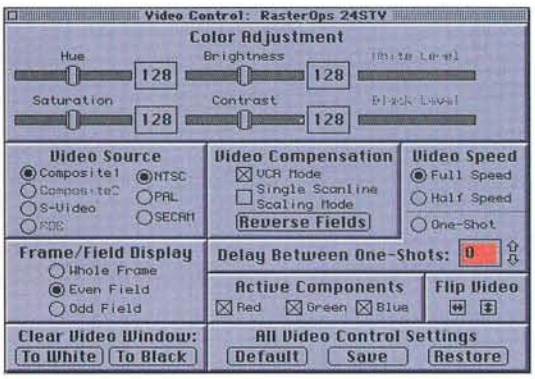
MOST OF THE VIDEO-CAPTURE BOARDS ACCEPT A *composite* video input through an RCA phono plug (composite video is a standard video signal that synchronizes the red, green, and blue components; composite video jacks are used in most home video equipment). In addition, some boards (such as Radius's VideoVision) have two or three input jacks that can be switched via software—a convenience if you're using multiple video sources.

Many capture boards also accept video input through RGB or Y/C (also called S-VHS) connectors. These connectors can sometimes provide a slightly better image—for example, S-VHS (which stands for Super-VHS) has more lines of horizontal resolution than the VHS videotape format. But QuickTime window sizes are so small, you won't be able to tell the difference in quality.

Sound Advice

THE VIDEOVISION, MEDIATIME, AND SPIGOT & Sound boards include the ability to record sound with your movies; the Moonraker accepts an accessory piggyback board for sound input. All three can record stereo sound—the MediaTime and Moonraker feature 16-bit sampling, while the VideoVision is limited to 8-bit.

For boards without sound input, you can get 8-bit mono sound either through a Mac's built-in microphone or—with poorer quality—through an external accessory such as Macromedia's MacRecorder Sound System Pro. A disadvantage with the MacRecorder, aside from having to buy one ($349), is that it draws a considerable amount of processing time from the CPU because the Mac manages the MacRecorder as an input/output device through the printer or modem port.

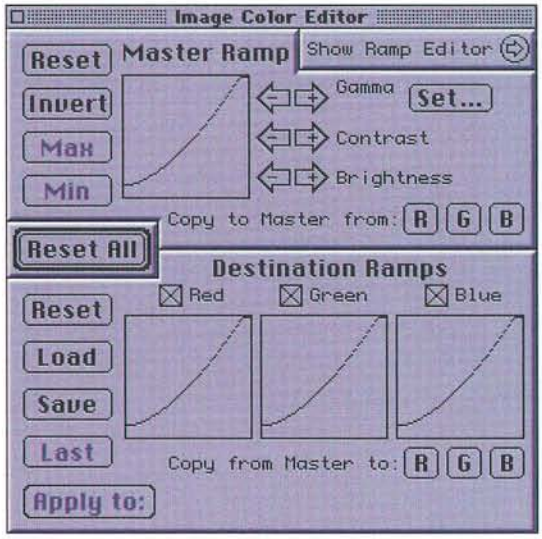


Picking and Choosing

FOR MY EVALUATIONS, I TESTED THE BOARDS IN A Mac IIci with 8MB of RAM, System 7.0.1, QuickTime Starter Kit 1.0, a standard 80MB Quantum hard drive, and Apple's 13-inch RGB display. I used Apple's 8•24 display board if no display adapter came with the capture board; this improves performance over the IIci's built-in video. These tests were for video capture alone, without audio, at the small QuickTime window size (160 by 120 pixels).

I performed a second series of tests on a Quadra 950 with 32MB of RAM and a 230MB Quantum drive. All the Quadra tests included audio as well as video recording using on-board sound input if available. The sound was recorded in mono at 11kHz, 8-bit sampling if possible. I conducted one round of tests with the small QuickTime window, a second at the larger 320-by-240-pixel size. Although QuickTime 1.5 wasn't available at the time of my testing, the latter size provides a good indication of how well the board will perform when mastering movies in the new, larger QuickTime window format.

Except for a special version of the VideoSpigot, I don't recommend these boards for the IIsi because of that machine's power and space limitations. The VideoSpigot is also the only board available for the Mac LC and LC II. I didn't test any boards with hardware compression, which were either much more than my $3500 price ceiling or were not available in time for review.



VideoSpigot

JUDGING FROM THE TESTS I PERFORMED, SUPERMac's VideoSpigot (the least-expensive video-capture board available) boasts the fastest frame rate by far on a IIci—20.8 fps, twice that of the VideoVision. The VideoSpigot even manages 16 fps in a large QuickTime window on the Quadra.

The VideoSpigot is a single NuBus board that works with a video-display board or built-in video; it also comes in Mac LC and IIsi versions, which are electronically equivalent but are sized to fit in those computers. The $1299 VideoSpigot Pro is a bundle of two boards—the VideoSpigot and SuperMac's Spectrum/8 24 PDQ video-display board—which supports a range of color monitors from 12-inch to 21-inch, a savings of $299 over buying the two boards separately. The VideoSpigot Pro is also available in a IIsi version for $1299; it supplies more-capable display support than do the circuits built into the IIsi. SuperMac also packages the VideoSpigot NuBus in two more bundles—Spigot & Sound NuBus ($579) and Spigot & Sound Pro NuBus ($1399)—that add a MacRecorder to the package.

Capturing video with the VideoSpigot and MovieRecorder, the recording component of the Apple QuickTime Starter Kit, turned in an average performance—9.9 fps on a IIci. But with SuperMac's ScreenPlay, a proprietary video-capture program, performance improved to 20.8 fps. The Spigot achieves its fast capture performance by skipping a conventional input buffer and going straight to an efficient color-coding format. As a result, the VideoSpigot displays only a tiny (80-by-60-pixel), very jerky, monochrome image during capture. Not to worry, though; Adobe Premiere, the video-editing program that's bundled with the VideoSpigot boards, enables you to adjust colors and hues after capture.

The VideoSpigot doesn't produce the sharpest picture, unfortunately, and the board offers no provision for adding a hardware compression piggyback board. On the other hand, it's the only board that doesn't need hardware compression for mastering QuickTime 1.5 movies, and it's inexpensive enough to buy simply for experimentation purposes.

Expect a lot of new product advancements in the coming months

The RasterOps Boards

RASTEROPS PRODUCES THREE VIDEO-CAPTURE boards with the same capture circuit but with different video-display adapters. The $999 24STV, $2199 24MxTV, and $3499 24XLTV boards support small (13-inch), medium (16-inch), and large (19- and 21-inch) displays, respectively. All the boards offer 24-bit color; all have hardware pan and zoom. The MediaTime board is the same as the 24STV with the addition of stereo sound input.

RasterOps supplies Media Grabber, a proprietary capture program, with all of its boards. It offers unusually flexible adjustments to the incoming video signal, not only for brightness, contrast, hue, and saturation, but also for tone reversal, solarizing, and much more. The overall picture quality is slightly sharper than that of the VideoSpigot and comparable to that of the VideoVision.

MediaTime delivered 9.9 fps on a IIci, which is average performance. On a Quadra, the RasterOps boards produced only 5.3 fps in a large QuickTime window, so the boards aren't suitable for mastering QuickTime 1.5 movies. And 15.2 fps for a small QuickTime window on a Quadra isn't impressive, either.

The performance limitations may not be a problem if you add a piggyback board, for hardware compression. RasterOps plans to ship the MoviePak, a JPEG compression piggyback board, before the end of 1992 for $1999; for at least a limited time, Adobe

VIDEO-CAPTURE BOARD DETAILS

Company	Product	Video-Input Jacks	Sound Input	Monitor[1] Bit Depth Supported	Hardware Pan and Zoom	Hardware Compression[2]	Bundled Applications	List Price
Radius	VideoVision	2	8-bit stereo	13/24-bit; 16 or larger/8-bit	no	yes	DiVA VideoShop, Macromedia Action	$2399
RasterOps Corporation	MediaTime	2	16-bit stereo	13/24-bit	yes	yes	none	$1999
	24STV	2	not included[3]	13/24-bit	yes	yes	none	$999
	24MxTV	2	not included[3]	16/24-bit	yes	yes	none	$2199
	24XLTV	3	not included[3]	19, 21/24-bit	yes	yes	none	$3499
SuperMac Technology	VideoSpigot NuBus	1	not included[3]	video display not included	no	no	Adobe Premiere LE[4]	$449
	Spigot & Sound NuBus	1	8-bit stereo	video display not included	no	no	Adobe Premiere LE[4]	$579
	VideoSpigot Pro NuBus	1	not included[3]	12, 13/24-bit; 16, 17/16-bit;19, 21/8-bit	yes	no	Adobe Premiere	$1299
	Spigot & Sound Pro NuBus	1	8-bit stereo	12, 13/24-bit; 16, 17/16-bit; 19, 21/8-bit	yes	no	Adobe Premiere	$1399
Workstation Technologies	WTI-Moonraker	4	8-bit stereo[5]	video display not included	no	no	none	$695

[1] Diagonal measurement in inches. [2] Designates whether or not a hardware compression piggyback board can be added to the video-capture board. [3] 8-bit sound available through built-in Mac microphone or MacRecorder. [4] LE stands for limited edition and doesn't offer all of the full application's features. [5] Mono sound input available using a Macintosh microphone or MacRecorder stereo input available through BoomBox accessory ($100).

Premiere will be bundled with the MoviePak. If the JPEG compression works well, this could make RasterOps a leader in full-screen, full-motion desktop video.

Among the RasterOps boards, the 24STV is the best bargain. The other models are much more expensive, and the 24STV still gives you plenty of editing flexibility—for example, you could hook up a 13-inch, 24-bit color monitor to the board for video capture and preview, as well as a larger 8-bit color monitor for editing and other work. The MediaTime board will suit users who want higher-quality stereo sound recording. Unfortunately, RasterOps doesn't offer any major software packages with its video-capture boards.

WTI-Moonraker

THE WTI-MOONRAKER IS A SINGLE NUBUS CAPTURE board that doesn't have a video-display adapter. The Moonraker performed well for small QuickTime window movies on the Quadra 950, but when I changed to the larger QuickTime window, the Moonraker essentially died. It recorded the sound fine but could capture only 1 or 2 fps. According to Workstation Technologies, a software bug in the Moonraker's interface to QuickTime is the culprit. At $695, plus $100 for the sound-input accessory board, the Moonraker is competitively priced but just isn't in the running.

VideoVision

AT $2399, RADIUS'S VIDEOVISION IS ONE OF THE most expensive capture boards I tested. From a video-production standpoint, it's also the most complete, with two sets of video and stereo audio inputs and full video-out and audio-out facilities.

The NuBus slot opening on the back of a Mac doesn't have space for all those connectors, so a heavy umbilical cord connects the main VideoVision board to a large breakout box with the connectors. The built-in video-display adapter supports 24-bit color on 13-inch monitors, 8-bit color on larger displays.

A connector on the main board supports piggyback boards, not only for hardware compression but also for effects such as superimposing titles; connectors on the breakout box accept separate video and audio inputs for effects. Specific accessories on piggyback boards and pricing weren't available at press time.

The VideoVision's performance was similar to that of the RasterOps boards, except it did better with a small window on the Quadra. Although the capture rates certainly fell short of the VideoSpigot's, the picture quality was cleaner and sharper.

The VideoVision should appeal to those in a video-production environment, for which input and output features are essential and the cost of adding a hardware-compression piggyback board probably isn't a major barrier. Although the VideoVision doesn't offer the wide range of image controls that come with the RasterOps boards, many video-production facilities have other means to accomplish the same ends. If your video work includes full Mac screens—such as for training videos—then the VideoVision is really the only choice.

Coming Attractions

FULL-MOTION VIDEO-CAPTURE BOARDS ARE STILL a relatively new product category. As with any burgeoning technology, you can expect to see a lot of new product enhancements and advancements in the coming months.

Several video boards offering JPEG hardware compression should arrive on the market in 1993, priced at about $2000. Currently, MPEG (Motion Picture Coding Experts Group) chips offer video playback or decompression only; an author/publisher must compress the video movie on a high-power workstation, where a one-minute movie takes from two and one-half hours to ten hours to compress. Sometime in late 1993 or early 1994, boards using the first full MPEG compression chips should be available. Although the first generation of full MPEG chips will be expensive, adding more than $1000 to the cost of a video-capture board, it's clear that they will mark the true birth of widespread desktop video. And further down the road is MPEG 2, a more advanced standard intended for broadcast-quality images.

The year 1993 should also see the introduction of QuickTime for Microsoft Windows, which will greatly expand the desktop video marketplace (and thus bring hardware prices down, no doubt). A full-blown market should emerge later in the decade when MPEG playback chips, or their equivalent, become a standard feature in desktop computers, just as every Mac has the ability to play back sounds today.

If you're eager to start those QuickTime cameras rolling, now is as good a time as any to get started, particularly with an inexpensive product like the VideoSpigot. On the other hand, with all the exciting enhancements and advancements around the corner, a little patience could save you some money, for no matter which video-capture board you buy today, chances are you'll want to upgrade or replace it within 12 months. m

See *Where to Buy* for contact information.

MW **EDITORS' CHOICE**

VideoSpigot SuperMac's VideoSpigot board is the cheapest and fastest video-capture board on the market and comes bundled with a limited edition of Adobe Premiere. You can't add a hardware compression board, but for QuickTime movies, you won't need one. **Company:** SuperMac Technology. **List price:** $449 to $1399, depending on bundling options.

CARY LU, author of *The Apple Macintosh Book,* 4th Edition (Microsoft Press, 1992), has been an independent film producer for *Sesame Street* and an associate producer for the *Nova* documentary series. His monthly column on the PowerBooks debuts in next month's *Macworld.*

Product-testing assistance provided by TIM WARNER of Macworld Lab.

REMEMBER THE OLD DAYS, when the type you saw on screen bore almost no resemblance to what came out of the printer? Remember making dozens of printouts just to get a few letter pairs kerned properly? Remember when what you saw wasn't even close to what you got? That's where we are today with color. Adobe

MANAGING COLOR

WITH NEW COLOR-MANAGEMENT TOOLS, WHAT YOU SEE IS VERY CLOSE TO WHAT YOU GET

Type Manager (ATM) and TrueType have all but solved the problem for type, but color users still face the screen-printer conundrum. The colors on screen simply don't represent the colors that are going to come out of a color printer or slide recorder, much less those that come off a printing press. Even choosing the same color in different applications results in very different colors on screen.

And with color, the problem is much worse than with type. Color printer output is expensive and (painfully) slow, and it's nothing compared with imagesetter film and proofs based on that film—figure a day or so turnaround, and $75 to $200 per page.

BY STEVE ROTH

RED
VIOLET
Opaque Black-A
PANTONE Process Yellow-A
PANTONE Process Magenta-A
PANTONE Process Cyan-A

Color-Management Systems

THIS IS WHERE COLOR-MANAGEMENT SYSTEMS (CMSs) from Apple, Electronics for Imaging (EFI), Eastman Kodak, and Tektronix step in. The most significant system is ColorSynch, an operating system extension, due from Apple by the time you read this, that will provide basic color matching between devices.

ColorSynch is set up so that an alternate CMS software can simply "plug in," effectively replacing the ColorSynch routines with its own. In the short term, however, that capability has delayed the operating system–level implementation of other CMSs. Both Kodak and EFI were planning to implement their color-management methods on a system-wide basis, and they still plan to—but under the aegis of ColorSynch, once it's available.

In the meantime, both companies have pulled back to providing their systems with specific products—EfiColor with EFI's Cachet image-editing software, and Kodak Color Management System (KCMS) with Kodak's line of products for color houses and service bureaus. Tektronix, likewise, now offers its TekColor CMS simply as a tool for users of its color printers, rather than as the industry-wide solution that was originally envisioned.

COLOR MANAGEMENT ALLOWS YOU TO RELY MORE ON YOUR MONITOR TO PREDICT OUTPUT

CMSs should operate on color the way ATM operates on type; they should make colors uniform and predictable across devices—monitors, scanners, and printers—as well as for color separations. CMSs will also offer several other advantages.

- A system-level CMS like Apple's ColorSynch promises to bring uniformity to the way different applications display colors. A given color specification in Claris MacDraw, for instance, will display the same as that specification in Aldus PageMaker.
- A CMS can simulate on screen or on printouts what different kinds of output might look like—a photo printed on colored stock, for instance, and viewed in daylight; or the same photo printed on uncoated stock, viewed under fluorescent lights.
- With a CMS you can view on screen a simulation of which colors are available and unavailable on your target output device.
- If you're passing files around within a workgroup, a CMS can help ensure that colors viewed on one machine look the same on another.
- High-end CMSs from EFI and Kodak also manage color separation—conversion of color values into the four process colors, cyan, magenta, yellow, and black (CMYK), to produce film for offset printing.

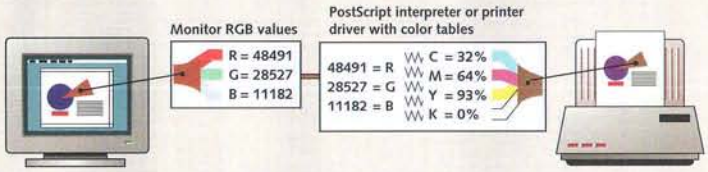
But even with color-management systems, you shouldn't expect exact correspondence between screen and output, or between different output methods. The media are simply too different. A monitor's color gamut—the range of colors it can display—varies greatly from that of a color printer, slide recorder, or printing press. The standard example is bright blue: it looks great on screen, but with the inks a thermal-transfer printer uses, you get blue green or purplish blue.

Given that, it might seem that the best solution is to simply resort to printed swatch books, as I suggested in "All about Color" (*Macworld*, January 1992). That's a reasonable solution if you're working with flat colors—tinted lines, boxes, curves, and type. You can look at a swatch book, type in the color specs, and know what your output colors will look like—even if they don't look right on screen.

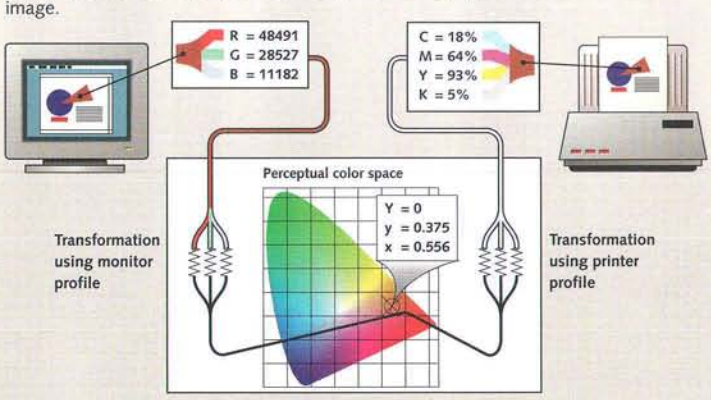
Color-management systems can go a long way toward alleviating the need for swatch books, however. Given a sufficient library of detailed device *profiles*, or *characterizations*, a color-management system can adjust colors as they move between devices to achieve remarkable uniformity. A profile describes the gamut of a device (the range of colors it can produce) and the dimensions of the color space within that gamut (how the colors are distributed). A profile can also contain one or more separation tables—lookup tables for converting colors to CMYK values. It also may contain mathematical hints that allow the color-management system to take greater advantage of a device or avoid some of its limitations.

Defining Color As We See It

Without color management, the computer sends an RGB (red-green-blue) color selected on screen to the printer driver or PostScript interpreter, where the RGB values are converted to CMYK (cyan-magenta-yellow-black) values that can be used by the printer. Such conversions often yield disappointing results—the output may vary markedly from the screen image.



To get as close a match as possible, a color-management system (CMS) uses the appropriate monitor and printer profiles to transform the RGB values and map them to a device-independent perceptual color space. Those specifications are then sent to the printer driver or interpreter. The CMS thereby creates a common language for the printer and monitor, leading to output that more closely approximates the screen image.



Color-management systems are of special interest to anyone who works with scanned images, since swatch books aren't of much use with scans. Sure, you can examine a single pixel in a scan with an on-screen densitometer, determine its numerical RGB or CMYK values, then look at a swatch book to see what that pixel will look like off the printer or the press. But that's just one pixel out of millions. Professional color separators can look at the numeric values in a section of, say, a human face, and judge whether they're appropriate; but for most mortals, numeric values and swatch books are not much help for working with scanned images.

The goal of color management is to allow you to rely more on your monitor in predicting what color-printer or slide-recorder output will look like, and to rely more on your monitor and color-printer output to predict what offset-printing output will look like. Where professional color separators almost completely "fly by the numbers" (knowing not to trust the screen), the rest of us need more visual landmarks to get where we want to go.

Apple into the Fray

THE MOST SIGNIFICANT RECENT DEVELOPMENT IN color-management systems for the Mac comes, not surprisingly, from Apple. As part of QuickDraw GX (the Mac's revamped—but as yet unreleased—graphical toolbox), Apple includes ColorSynch—a system extension and set of device profiles that implement a system-level CMS for the Mac. There's also a new extensible Color Picker tool kit to which developers can add their own models.

Since ColorSynch works on the system level, expect almost every application to take advantage of it in the next year. Also expect to see ColorSynch profiles for almost every device on the market—including scanners, monitors, and printers. (Apple is leaving it up to device manufacturers to create their own ColorSynch profiles.) Apple provides developers with a profile-building software utility, and you can be certain that calibration tools such as the RasterOps Correct-Color Calibrator will soon be able to create ColorSynch profiles, if they can't already. Since it uses a fairly simple color-management method—the software engine that converts colors between color models and device spaces—ColorSynch is also relatively fast compared with the more complex systems discussed later.

That simple method, however, can be inaccurate and lacks certain features—notably process-color separation. While the new system lets one application pass CMYK information to another and converts RGB colors to CMY, ColorSynch won't convert to the CMYK values essential to offset printing. ColorSynch is great for anyone who is producing slides from Microsoft PowerPoint and just wants some improvement in screen-to-output fidelity. When color-matching accuracy and color-separation prowess is essential, however, you'll want to turn to one of the more robust CMSs, from EFI or Kodak.

Kodak Color Management System

KODAK HAS TWO COLOR-MANAGEMENT SYSTEMS, Kodak Color Management System and ColorSense. They differ markedly in operation and in their intended markets. KCMS, Kodak's high-quality solution to color management, is implemented in products for people producing imagesetter output for offset printing. KCMS is central to Kodak's Precision series of products (calibration tools for imagesetters, scanners, and digital color printers). It's also the heart and soul of Kodak's two complete hardware-and-software systems for service bureaus and color houses—Prophecy and PCS100.

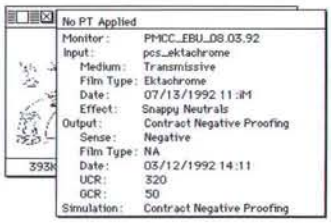
Prophecy is an $89,500 combination of hardware and software using Macs and (primarily) Sun workstations. PCS100, a $30,000 Mac-based system, works with Adobe Photoshop to implement KCMS from scanner and monitor calibration through color proofing of film output. The Mac Quadra 950 and a SuperMac monitor make up the platform for PCS100, which includes a monitor calibrator, a custom accelerator board, and a software set of several applications and utilities (see "How the Kodak System Works").

PCS100 is designed so you create your own scanner and monitor profiles based on your equipment and environment. The system comes with one output profile for a given color-proofing system (such as 3M's MatchPrint and Enco PressMatch), as well as a profile for the Kodak XL7700 color printer. Profiles for other

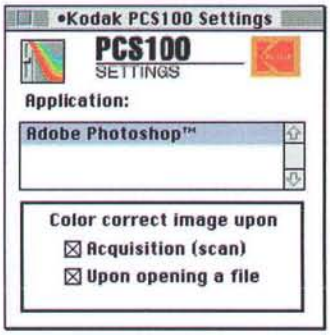
How the Kodak System Works

The Kodak Color Management System software is at the heart of the Eastman Kodak PCS100 system.

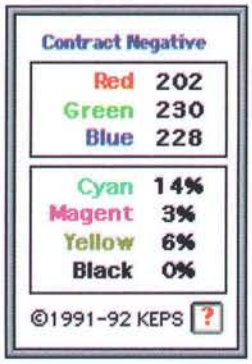
Kodak PCS100 Color Manager is a control panel that lets you specify the profiles to use for your monitor, scanner, and output method. Those profiles are accessed by PCS100's Photoshop filters.



An extra button appears in Photoshop windows when running under the PCS100 system. Clicking on this button provides information on the profiles used to create the file.



The PCS100 Settings control panel enables you to set preferences for different applications. It currently works only with Photoshop.



Since the Kodak software is responsible for RGB-to-CMYK conversion, Photoshop's densitometer tool can't display proper CMYK values. PCS100 provides a separate densitometer tool for that purpose.

proofing systems are available at additional cost.

PCS100 is designed to produce a screen display that accurately matches a film-based color proof, so profiles for color printers aren't currently available. Nor are there tools for creating such profiles. According to Kodak, the variability of color-printer output (even from the same unit on different days) is too great to allow for accurate calibration without the use of an expensive spectrophotometer.

APPLE'S COLORSYNCH IS THE MOST SIGNIFICANT RECENT DEVELOPMENT

Photoshop is the central working tool—and the only Mac application that takes advantage of KCMS for PCS100. Once you've created profiles for your devices, you apply those profiles as Photoshop filters. If you want a screen rendition of what the color proof of a separated scan will look like, for instance, you apply that simulation filter to the scan. KCMS (rather than Photoshop) is also responsible for creating the separations, which you can save to disk as Desktop Color Separation (DCS) files for placement in other programs.

RasterOps CorrectColor

KCMS IS ALSO AVAILABLE IN AN OFF-THE-SHELF PACKage from RasterOps, dubbed CorrectColor Management System (RCCMS). For $2498, RasterOps provides monitor-calibration hardware and software and Kodak's color-management software. An optional accelerator board for Kodak's software (essentially the same as the one in Kodak's PCS100) costs $3999. The calibration tools can also be used for measuring color and density values in reflective and transparent media.

Like PCS100, the RasterOps system achieves its color-management effects via Photoshop filters. Unlike PCS100, CorrectColor comes with scanner profiles (currently available for Microtek, Nikon, and Optronics scanners), although it offers no facility for creating new profiles or modifying those provided. RasterOps also offers output profiles for several color printers (the Kodak XL7700 and XL7720, the RasterOps CorrectPrint 300, and the QMS ColorScript series). You get a couple of scanner and output profiles for the base price. Additional input profiles are $199; output profiles run $299. But the system lacks output profiles for offset printing. That problem, and the inability to create or modify profiles for input or output, makes for a high-end CMS that's missing the tools for high-end output.

Radius PrecisionColor Matching System

ANOTHER MONITOR MANUFACTURER, RADIUS, HAS also developed a system that combines KCMS with a monitor calibrator. Like PCS100 and the RasterOps

COMPARING THE CMSs

CMS	Description and Shipping Status	Advantages	Disadvantages
Kodak ColorSense Eastman Kodak	Monitor calibrator, scanner calibration test strip, scanner, monitor, printer profiles; color matching application; system extension. Should ship by late 1992.	Inexpensive; includes monitor- and scanner-calibration tools; works with object PICT as well as bitmapped formats; ColorSense Extend simulates printer output in any application; corrects printing output for QuickDraw applications; many output profiles.	No process separations; no offset printing or proofing profiles; less color-matching accuracy than EfiColor or KCMS.
ColorSynch Apple Computer	Part of QuickDraw GX. Should ship by early 1993.	System-level; free; widely distributed; will be well-supported by applications and device profiles; fast; extensible via plug-in CMSs and color pickers.	No process separations; not accurate enough for high-quality work.
EfiColor Electronics for Imaging	Color-management engine and output profiles. Shipping with Cachet color-image editor; XTension for QuarkXPress to ship with QuarkXPress version 3.2, profile builder to ship in early 1993; plug-in system-level version for ColorSynch to ship in 1993.	Precise, hand-tuned output profiles and accurate color-matching method; innovative tagging approach in XTension allows for appropriate use of color-matching methods.	Currently no scanner or monitor calibration; output profiles cannot be modified; no scanner or monitor profiles with Cachet; no scanner profiles with XTension.
Kodak Color Management System (KCMS) Kodak Electronic Printing Systems	Color-management technology implemented in several ways. Included in Precision, Prophecy, PCS100, Radius, and RasterOps CorrectColor products; plug-in system-level version for ColorSynch to ship in 1993.	Precise color-matching method; can adjust monitor and scanner profiles with calibration tools; hardware acceleration available; profiles for color proofing systems.	PCS100 works only with Photoshop; includes no profiles for color printers.
Radius PrecisionColor Matching System Radius	Combination of Radius PrecisionColor monitor calibrator, KCMS software, and scanner and printer profiles. Provides color matching using Photoshop filters. Currently shipping.	Monitor calibrator; creates custom monitor profiles; Photoshop filter shows side-by-side view of original and simulation.	No scanner- or printer-calibration tools—prebuilt profiles only; offset printing profiles are additional expense, as are additional scanner and printer profiles.
RasterOps CorrectColor Management System RasterOps Corporation	Combination of CorrectColor monitor calibrator; KCMS software; scanner, monitor, and printer profiles. Provides color matching using Photoshop filters. Currently shipping.	Includes monitor calibrator that creates KCMS, CorrectColor, and Photoshop monitor profiles; calibrator can be used as densitometer and colorimeter.	Prebuilt scanner and output profiles only—no scanner or printer calibration; limited printer profiles available; no profiles for offset printing or proofing.
TekColor, TekColor PS Tektronix	Currently embodied in printer drivers, control panel, and utilities provided with Tektronix printers, in SuperMac SuperMatch monitor calibrator, and Savitar ScanMatch scanner-calibration software.	Provides static preview of printed output in any application; includes PostScript utilities for use with applications that bypass QuickDraw printing.	Primitive color-matching method; few profiles; limited third-party support.

CorrectColor system, Radius's $1199 PrecisionColor Matching System (PCMS) is based on a Photoshop filter that calls on the KCMS engine and database of profiles. It uses different filters than in PCS100 or RCCMS, however; it's more convenient because it lets you choose profiles when you use a filter, rather than choosing them via a control panel. As with PCS100 and CorrectColor, the filters provide options for scanner simulation (showing on screen what the original looks like), output simulation, and output correction.

The 16 PCMS profiles, for scanners and printers, come on a locked CD ROM. The base price allows you to unlock one scanner profile and one output-device profile. Monitor profiles are created using Radius calibration hardware and software. No profiles are provided for offset printing (hence there are no tools for final separation output), though eventually they will be available for about $900, according to Radius.

Kodak ColorSense

KODAK ITSELF ALSO OFFERS A SHRINK-WRAPPED, off-the-shelf color-management solution aimed at people who aren't satisfied with Apple's ColorSynch, but who don't need the color-separation features of KCMS or EfiColor. Kodak's $495 ColorSense package consists of a monitor calibrator and a scanning target, plus two applications—one for creating scanner and monitor profiles; another for opening, adjusting, saving, and printing color graphic files.

With the ColorSense Color Manager application, you can open a color bitmap or object PICT file, automatically adjust it based on your scanner profile so the image more closely matches the original scan, view on-screen simulations for different output devices, and then print or save the image with the appropriate corrections applied.

ColorSense also includes a control panel that implements its color-management method for any application. It adds a button to the top right of document windows; when you click on the button, ColorSense Extend simulates printed output on screen. With programs such as Microsoft PowerPoint or Aldus Persuasion, which use the standard Apple QuickDraw routines for printing, ColorSense Extend will also match printed output to what you see on the display. (This does not work with programs like Aldus PageMaker and FreeHand, QuarkXPress, or Adobe Illustrator, which bypass QuickDraw for printing.)

ColorSense comes with a wide variety of output profiles (but none for offset printing or proofing systems), and you can modify monitor and scanner profiles to match your hardware, making ColorSense a versatile and complete solution—as long as you're not going to press.

EfiColor

EFICOLOR, FROM ELECTRONICS FOR IMAGING, WAS conceived as a system-level color-management system (originally named EPort), and that is still the intention, once ColorSynch settles down. In the meantime, EfiColor is used by only two products—Cachet, EFI's $595 color-image–editing software (see *Reviews, Macworld*, December 1992), and the EfiColor XTension for QuarkXPress. Both rely on the EfiColor Processor (the color-management "engine"—software that handles color space conversions) and the EfiColor database of device profiles to manage color-matching and separation.

Cachet currently provides profiles for six color printers and three offset-printing standards. Many additional output profiles are available for between $129 and $329 each. Cachet assumes that most photos need correction on screen, so the product de-emphasizes the importance of remaining as true as possible to the original. Therefore, Cachet provides no profiles for monitors or scanners, nor any method for creating those profiles. Market demands at the high-end will likely push EFI to provide those profiles and related tools for a system-level version of EfiColor, however.

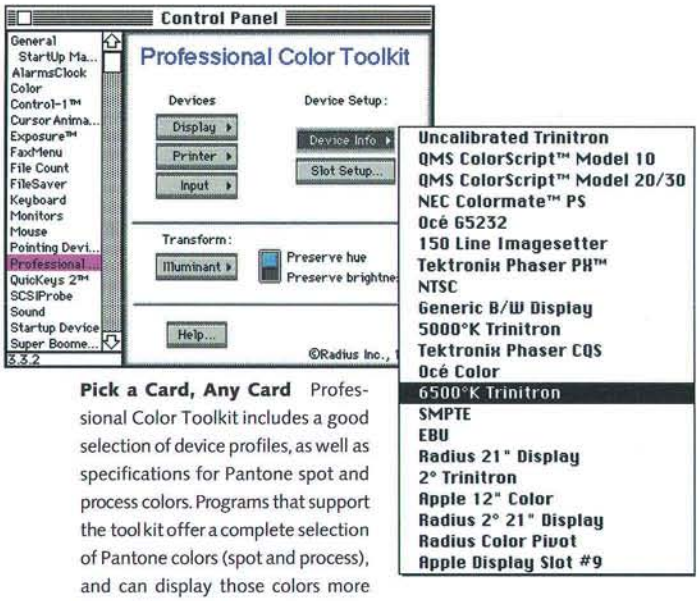
EfiColor's latest implementation, the EfiColor XTension bundled with QuarkXPress version 3.2, which should be available early in 1993, takes the system—and color management in general—to a new

What about Pantone?

One area of color that all the color-management systems currently fail to address is the Pantone Matching System (PMS). Almost anyone producing color work for offset printing needs to use Pantone specifications occasionally or regularly, and would like to see a more-accurate representation of Pantone colors on screen and on printer output.

The problem is partially addressed by Professional Color Toolkit (see "Pick a Card, Any Card"), a control panel device developed by Radius in cooperation with Pantone. The tool kit includes profiles for a variety of display and printing devices, as well as RGB, CMYK, and CIE values for all the Pantone colors. Pantone-licensed programs can take advantage of the tool kit to provide access to all the Pantone swatch books and to more-accurately display and print the colors in those books (both spot colors and those in the newer process-color swatch books).

Radius recently licensed all rights and source code to Professional Color Toolkit to Pantone, which is now responsible for updating it and planning Toolkit's future. That future is uncertain, though it seems likely that the Pantone swatch systems will emerge as plug-in color pickers working within Apple's color-management system, so that they will work in conjunction with other systems.



Pick a Card, Any Card Professional Color Toolkit includes a good selection of device profiles, as well as specifications for Pantone spot and process colors. Programs that support the tool kit offer a complete selection of Pantone colors (spot and process), and can display those colors more accurately on screen.

level. It allows you to tag elements on a QuarkXPress page, specifying their source profile (Apple 13-inch RGB monitor, SWOP-corrected scan, Pantone, and so on). EfiColor handles the screen display and separations for all elements, using one of two gamut-mapping methods (Photographic and Flat Color), depending on which is appropriate to the source and output profile. EfiColor will also read tags that are included in files in EFI's new Metric Color Tag (MCT) format (Cachet is currently the only program that includes these tags). The EfiColor XTension comes with 4 output profiles and 10 or 12 monitor profiles. The XTension adds a gamut alarm—it goes off if a selected color falls outside the gamut of the target device—to the QuarkXPress color-picker dialog box. Additional monitor profiles will be available for free via online services and other channels. No scanner profiles are available, making this system most useful to Cachet users who can save MCT-tagged files.

Based on this innovative QuarkXPress connection and the enthusiastic initial response to Cachet—particularly its color matching and output quality—EfiColor holds promise of being the CMS of choice (with KCMS as the other contender) in the high-end color-separation arena.

POSTSCRIPT LEVEL 2 USES A SOPHISTICATED COLOR-MANAGEMENT ENGINE

TekColor

TEKTRONIX HAS BEEN A LEADER IN PIONEERING THE use of device-independent color on the Mac. In 1989 the company came out with TekColor, a CMS that it sought to promulgate as an industry standard. That effort has fallen by the wayside (the companies that Tektronix was trying to evangelize were primarily, and of necessity, its competitors), but TekColor lives on in printer drivers and utilities provided with Tektronix printers. It's also available in two products from TekColor licensees—SuperMac's SuperMatch monitor-calibration system and Savitar's ScanMatch scanner-calibration software.

The latest incarnation of TekColor is TekColor PS, which comes bundled with the Tektronix Phaser line of PostScript Level 2 color printers. (PostScript Level 2 is the latest generation of Adobe's page-description language. It includes sophisticated color-management capabilities.) It combines a control panel and a Chooser-selectable PostScript printer driver that offers a limited set of tools and options for adjusting printed output. Tektronix also provides downloadable PostScript routines for use with applications that bypass normal QuickDraw printing methods. The most significant thing about TekColor PS is its use of PostScript Level 2 color commands to effect its color matching. No other CMS does that. The TekColor Picker that came with previous versions of TekColor is not provided with TekColor PS; instead you get an F-key that temporarily freezes the screen and adjusts the colors to simulate what printed output will look like.

PostScript Level 2

THOUGH DEVELOPERS LIKE TEKTRONIX ARE BEGINning to scratch the surface, few if any are tapping the color-management potential of PostScript Level 2. There's a sophisticated color-management engine built into Level 2, and programs can tap Level 2's powers in many different ways—to achieve color matching, color-model conversion, and even color separation—with color-management processing happening in the output device, rather than in the computer.

There are advantages and disadvantages to this approach. Service bureaus, which prize every second they can eke out of their imagesetters, would much prefer to handle the processing on accelerated Macs that then send corrected data to PostScript. Other users, whose Macs are always busy but whose printers often sit idle, will be more likely to take to the correct-it-in-the-printer approach espoused by Adobe.

Another factor is screen previewing. If your system relies on Level 2 to handle color matching, it's a one-way street. You can get the printed output to more closely match the screen, but not vice versa.

The Future of Color Management

A COMPLETE COLOR-MANAGEMENT SYSTEM SHOULD provide fast, accurate color matching between any two devices, and should include hand-tuned profiles for a wide variety of scanners, monitors, printers, slide recorders, and offset-printing methods (as well as the means to customize profiles). The system should work with all your software packages, providing scanner-to-

What's a Color?

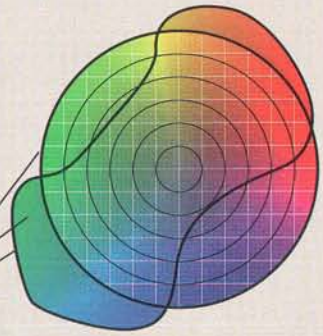
Asking "what's a color?" may seem like asking "what's a tree?" but it's actually a tough question, and one central to understanding how color-management systems work. If you specify certain red, green, and blue (RGB) values, are you specifying a color? Not really, because those values yield very different colors depending on the device they're sent to. The same is true with specifying colors using cyan, magenta, yellow, and black, or CMYK (though with CMYK, printed swatch books can provide a reference, so most people agree that certain values yield a particular color).

The problem lies in specifying colors by what the colors look like, not by the numeric values they are composed of. To that end, all the color-management systems work internally with device-independent, or perceptually based, color models. These models (CieXYZ, CieL*a*b, and other cryptic monikers) all define the full range of human color-perception and use numeric values to specify colors within that space (see "All about Color," *Macworld*, January 1992). Unlike RGB and CMYK values, which are dependent on the device they're displayed on, values specified using a perceptually based color model really do specify a given color.

RGB and CMYK values are useful in defining a color, however, if you specify which device you're talking about. "The values *r, g,* and *b* as displayed on an Apple 13-inch RGB monitor," for instance, does name a color. There's a reference standard (in this case the Apple 13-inch RGB characterization) that tells us what those RGB values look like. This method of specifying colors is often referred to as *calibrated RGB*. A CMS can use straightforward mathematics to convert between calibrated RGB and a device-independent color model, or vice versa.

Color-Matching Options

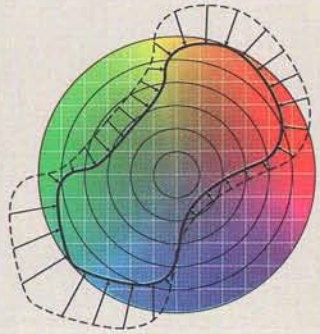
Color-management systems attempt to map the colors in a source image, such as a scanned photo or screen drawing, to the closest colors offered by the output device, in this case a QMS ColorScript 100 Model 30. Two of the many color-matching methods are shown below. (Photo courtesy of PhotoDisk.)



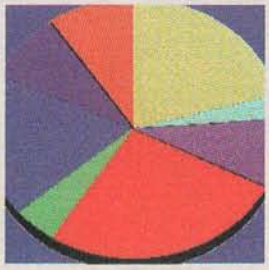
Scanned photo

Screen drawing

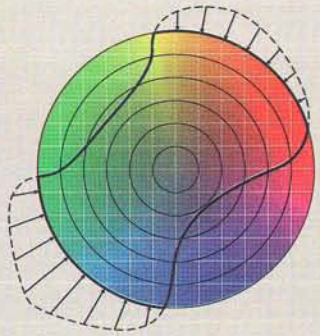
Perceptual Matching
Screen colors are mapped uniformly within the printer gamut. None of the resulting colors are the same as in the original screen image; but the colors maintain the same proportional relationships, and the total number of colors in the image remains the same—albeit within the more narrow range of the printer. This makes perceptual matching best for photographs. Note the close approximation of skin tones in the baby's face, with little blue contamination. But blue areas in the solid-color image were forced into a distinctly purple tone.



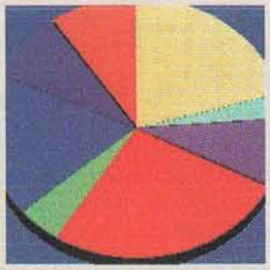
Output after perceptual matching



Colorimetric Matching
Screen colors outside the printer's gamut are mapped to the closest match, but screen colors that fall within the printer's gamut don't change. This produces fewer colors, since several screen colors may be mapped to a single printer color. Colorimetric matching works well with spot colors, where the closest match is most important. In the pie chart, for example, the yellow is less polluted with cyan than in the perceptual matching test, and the blues appear more blue. In contrast, the photograph has an overall blue cast, and skin tones a purple tinge.



Output after colorimetric matching



screen-to-output color matching, as well as on-screen simulations of various output methods. Unfortunately, no current system offers all those features.

Still, these are auspicious times for color management. In the next year Apple's ColorSynch will become established as the standard, with just about every hardware and software manufacturer supporting it to some degree. KCMS, ColorSense, and EfiColor will emerge as plug-in, system-level adjuncts to ColorSynch, providing more-demanding users with the tools they need for higher-quality output.

EfiColor and KCMS, with their sophisticated color-separation engines, will slug it out for the dollars of higher-quality publishers. It remains to be seen which of these will be most widely supported by the industry—which will develop the largest library of device profiles and supporting calibration systems. (EfiColor seems to have the early lead with its newly announced library of output profiles.) ColorSense, with its low price, large library of profiles, and simple operation, will make good sense for the middle ground—those who want "good enough" color. TekColor will fade away, relegated to the role of a utility for those who happen to have Tektronix printers.

One thing is sure, however. In the next year, you will be able to trust your monitor, your printer, and your software more than ever. We'll move much closer to the situation we now have with type, so that what you see, finally, bears a reasonable resemblance to what you're going to get. ■

See *Where to Buy* for contact information.

STEVE ROTH is coauthor of *Real World PageMaker* (Bantam Computer Books, 1990), and editor of *Real World FreeHand* and *The QuarkXPress Book* (both Peachpit Press, 1991).

Among the LCD panels with the best image fidelity are (clockwise from top) the Chisolm TFT Rainbow HD Model 700, nView MediaPro, and Dolch Prism Pr1050.

Crystal-Clear Presentations

MACWORLD LAB TESTS THE LATEST CROP OF COLOR LCD PROJECTION PANELS

by Suzanne Stefanac

After hours of hard work on your presentation, the text reads well, the graphics are riveting, and the splashy video segment is sure to clinch the deal. One dilemma remains: Which display technology will show off your presentation to best advantage?

An old-fashioned slide show lacks a dynamic edge. Exporting the presentation to video means giving up interactive control. A large-screen monitor is still too small for the audience you have in mind; besides, it's too heavy to take on the road. A three-gun cathode-ray tube (CRT) video-projection system is even heavier, and it requires the expertise of an audio-visual technician to focus the beams. And liquid crystal display (LCD) projection panels still aren't up to the task, right?

Wrong. It's true that LCD projection panels have generally been considered poor cousins in the display family. They've been plagued with limited color ranges, poor contrast ratios, narrow

PHOTOGRAPHS BY GEOFFREY NELSON

Wave of the Future LCD projection units that incorporate a projector are a growing trend. They allow a tighter focus and better control of the light source, and you don't have to worry about ending up with an inadequate overhead projector in a strange city. We looked at three models: (counterclockwise from upper right) the In Focus System 6000, nView Luminator, and Sayett Mediashow.

viewing angles, and slow response times. But the current batch of panels are a new breed. Connect one to your computer, and vibrant animations and full-motion video clips dance between the layers of clear glass. Place the panel on an overhead projector, and the far wall fills with crisp, clean images.

Differences Emerging

CHOOSING LCD PROJECTION PANEL TECHNOLOGY is easy. Selecting a panel from the spectrum of products on the market is not. At first glance they seem to be amazingly alike.

Each of the 12 panels tested by Macworld Lab comes in notebook-size casing that connects fairly easily to a computer or composite-video output device (which can be a TV, VCR, video camera, or videodisc player). These panels represent the companies' best products; budget-conscious users will be able to find panels that offer narrower color ranges that nonetheless are fine for many business and education uses (see "LCD Panels in Focus"). You can also find some of the panels reviewed here from distributors such as Boxlight Corporation, MacLand, and NovaCorp International, for less money and with different names.

We also tested three products that combine the panel and an overhead projector in a portable unit. These have several advantages, of which the most important is that you are guaranteed enough light to display your images. Although an LCD panel may seem to be clear, it typically blocks more than 95 percent of the light going through it. That means you need a very bright light source, and that usually means you need an expensive, modern overhead projector with a brightness of 75 footlamberts or more. Such a projector can cost several thousand dollars. And if you travel, there's no guarantee you'll find such a projector at each site. The LCD projectors with built-in light sources solve this problem, although at the cost of greater weight —anywhere from 20 to 40 pounds, versus 7 to 12 pounds for panels alone.

Whether panels or projection units, all products tested claim to display at least 256 colors. Although individual panels allow for a variety of adjustments, all include controls familiar to anyone who owns a color television: contrast, brightness, and tint.

Connecting to a Mac II or Quadra is no problem for any of the panels, although the necessary cables to connect to a Mac for Dukane Corporation's Magniview 494, In Focus Systems' TVT-3000, Sharp Electronics' QA-1050, and Telex Communications' MagnaByte 1000 are optional, so be sure to specify that you need Mac cables when you buy. All the tested panels let you view images concurrently on the panel and on a standard 14-inch monitor. Despite the Mac LC II's nonstandard video signal, all the panels work with this machine, as long as you don't have a 12-inch color monitor attached to the LC II. The Proxima Corporation Ovation A822C further requires that you also connect the panel to a 14-inch monitor.

To run a panel using a PowerBook, you need a third-party adapter, such as the Radius PowerView, Envisio Notebook Display Adapter, Lapis Technologies PowerBase, or Aura Systems ScuzzyView. (*Macworld* will review several such adapters next issue.) But even with the adapters, we couldn't run the Dukane Magniview 494 or the In Focus TVT-3000 or System 6000 with PowerBooks.

Color Schemes

A GROUP OF MACWORLD EDITORS SPENT SEVeral days in a dark room surrounded by images projected by LCD panels; we saw real differences among the panels, particularly in how they display combinations of color. All the panels reproduced a fairly wide spectrum of color—even the passive matrix ColorWorks A522C from Proxima Corporation, although its projected images had a faint blue cast. The other LCD panels use the better-quality but more-expensive active matrix technology that prevents such casts.

Despite the fact that promotional materials for LCD projection panels often contain the phrase "true color," the term is not being used the same way it is used elsewhere in the computer industry, where it has come to mean full 24-bit technology yielding 16.7 million colors. Vendors claim all sorts of num-

bers for their panel's color range. The differences are not due to the capabilities of the liquid crystals, since most of the liquid crystals within a display are made by the same few Japanese firms. Instead, the differences are due to how the LCD panel vendors control the amount of light passing through the liquid crystals.

Each company installs in its panels controller boards that apply proprietary schemes that create the perception of a different number of colors. These schemes control the amount of voltage applied to each pixel on the panel; the more levels of voltage you apply, the more shades of colors you can see (see "How Color LCDs Work"). We found some schemes to be more successful than others.

But before we could evaluate a panel's color range, we first had to get the panel to display its maximum number of colors. That was almost always a challenge, since the controls were often unintuitive and since the color settings usually had to be tweaked for each new image.

First, all the panels offer more than one level of color; for example, the Sharp Electronics LCD Products Division QA-1050 (and a beta version of the new QA-1150) toggles between 512 and 185,000 colors, while the Magniview 494 offers seven levels: 8, 64, 729, 2000, 8000, 21,000, and 117,000 colors. Most panels require that you choose the number of colors to be displayed from a control panel or from a remote-control device; the Sayett Technology Mediashow projection unit and nView Corporation's MediaPro panel and Luminator projection unit automatically configure themselves to the highest number of colors your computer can handle.

ALL THE PANELS REPRODUCED A FAIRLY WIDE SPECTRUM OF COLOR

At the Controls

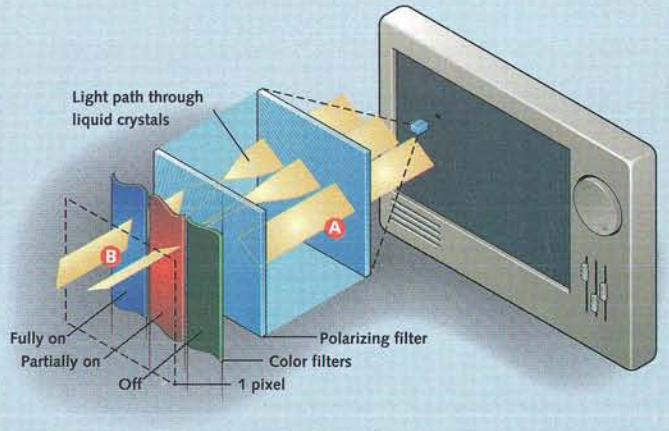
IN VIEWING OUR VARIOUS TEST IMAGES—COLOR wheels, block text, high-resolution full-color scanned photographs, and composite video (music videos played on a VCR)—we found, predictably enough, that the lower numbers of colors proved best for text and simple graphics, and the highest number of colors generally improved the display of composite video and scanned photos. Still, we found trying all the options to be a good idea—you can't always predict which setting will best suit a given image.

Each panel offers a unique set of knobs, buttons, and menu items that let you further tweak the image. Most let you nudge the image to fill the screen to best advantage, and you generally have the option to clear the screen. Many let you invert the image, a feature designed for DOS users, since the white-text-on-black-background DOS display can be hard to read when projected.

How Color LCDs Work

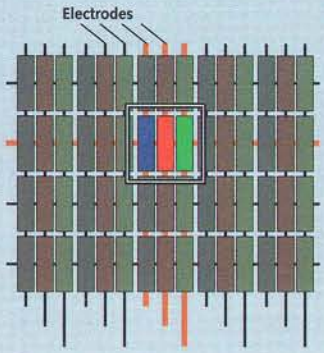
Left to their own devices, the liquid crystals in an LCD panel align themselves between the glass plates in a twisted pattern; light can then pass through the panel unobstructed. When an electric current is applied, the liquid crystals untwist **(A)** and light is blocked by the polarizing filter on the glass plate. Different amounts of twist result in different amounts of light passing through.

In color LCDs, there are three subpixels per pixel—one each for the pixel's red, green, and blue components. A film with alternating stripes of blue, red, and green adds color **(B)** to the light emanating from the liquid crystals forming each pixel.



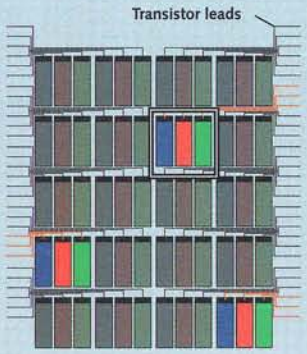
Passive Matrix

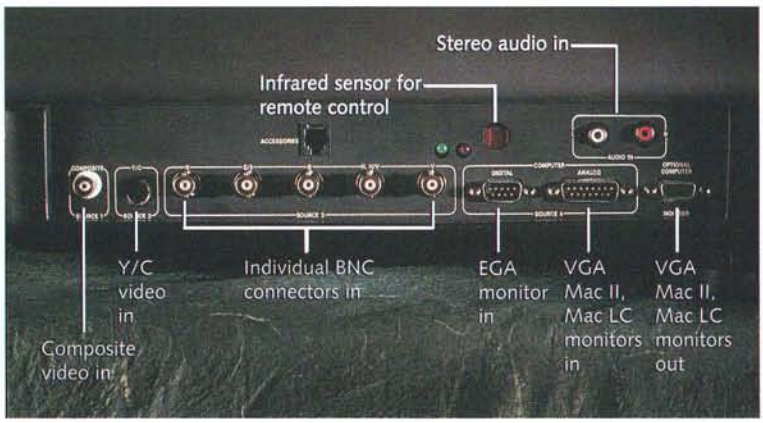
Less-expensive panels use a grid, or matrix, of electrodes (flat wires). The intersection of current from the horizontal and vertical electrodes—called passive matrix technology—determines the charge at a particular spot in the panel. That charge determines whether that spot is on or off, and its intensity if on. Current moves from electrode to electrode in a cycle. Only one pixel at a time can be activated.



Active Matrix

Active-matrix panels are more complicated and more precise. Rows of horizontal and vertical electrodes, called thin-film transistors, form a grid, or matrix, of pixels. Each pixel can be controlled individually, staying on as long as needed, rather than having to be refreshed periodically the way pixels in a passive matrix display are. Several pixels can be activated simultaneously.





Connection Options The nView Luminator supports the widest variety of inputs, making it a good example for showing standard video ports. The three types of video ports at left are the common forms for standard TV and VCR video. The fourth type of port handles the standard computer video (EGA and VGA). Mac II and LC owners can connect their Macs to the VGA port by using a VGA-to-Mac adapter, which most vendors now bundle with their LCD units. A VGA-out port lets you duplicate the projected image on a second monitor (handy for the LCD's operator). A VGA-to-Mac adapter is also needed.

The Vision 16.7 from Apollo includes the fewest controls, since it is preconfigured at the factory, which makes it good for plain old plug-and-play operation. The In Focus TVT-3000, Proxima Ovation A822C, and Sayett Mediashow boast the greatest number of controls, giving you more flexibility in how to display a variety of images.

For the daring, several panels offer special effects. If, during your presentation, you find that you need to access your hard drive to check a database or to edit text, the Chisholm TFT Rainbow Models 600 and 700, Dukane Magniview 494, and Proxima Ovation panels let you freeze the current image on the panel while you navigate elsewhere on the computer. The nView MediaPro panel includes a nice set of "curtain" effects that smooth transitions from one image to another—just like higher-end presentation programs offer. The Dolch Computer Systems Prism Pr1050 and the Sharp panel let you zoom in on the center of the screen, a boon for presentations with more-sophisticated graphics. (People usually center a graphic object of interest, while text usually runs from one side of the screen to the other.) The Dukane Magniview 494, nView MediaPro, both In Focus units, and both Proxima panels let you set the panel for rear projection.

Gauging the Trade-Offs

TO ACHIEVE THE SHARPEST POSSIBLE IMAGE with the truest color reproduction often involves trade-offs. For example, we found that the Apollo Vision 16.7, nView MediaPro, and In Focus Systems panels displayed impressive color, but fine lines in text and images appeared a bit blobby despite our best knob-turning and button-pushing. This blobbiness is caused by the LCD panels' equivalent of moiré patterns, in which the matrix of the liquid crystals doesn't quite match the matrix of the screen image's pixels. Other units, most notably the Proxima ColorWorks and Sayett Mediashow, managed to display fine lines with aplomb; but alas, we were never able to bring up really wonderful color. The only panels to display a true gray—a good test of color fidelity because it requires equal amounts of red, green, and blue—were the nView MediaPro and the Chisolm TFT Rainbow HD Model 700.

While most of the panels display the 640-by-480-pixel standard resolution of a 14-inch monitor, the In Focus System 6000 is unique in that it relies on a resolution of 480 by 440 pixels. The projected image is very crisp, but because the panel is displaying fewer pixels than the computer is generating, you must choose between compression and cropping. The default setup, which we found to be quite satisfactory, applies a compression scheme to the horizontal pixels and deletes the bottom 40 pixels. You

MW LAB Rating LCD Panel Quality

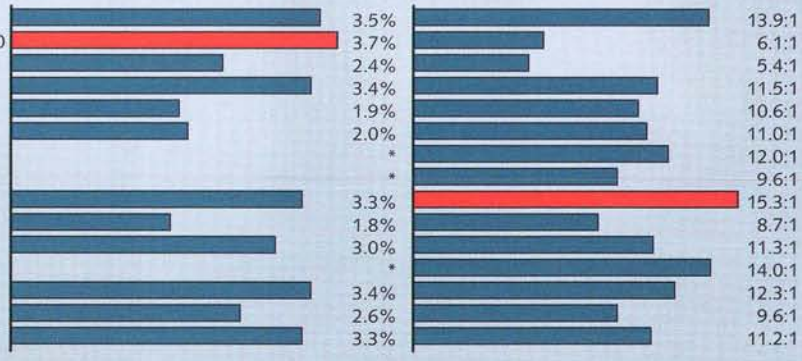
Best results are highlighted in red. Longer bars are better.

Transmissivity

Even though they appear clear, the liquid crystals in the panels block most—but not all—of the light from a projector. The more light they let through (the higher their transmissivity), the better.

Contrast Ratio

Contrast ratio measures how much brighter the whitest pixel is than the blackest. A ratio of 6:1 or better is good; a ratio of 8:1 is excellent.



	Transmissivity	Contrast Ratio
Apollo Vision 16.7	3.5%	13.9:1
Chisolm TFT Rainbow HD 700	3.7%	6.1:1
Chisolm TFT Rainbow 600	2.4%	5.4:1
Dolch Prism Pr1050	3.4%	11.5:1
Dukane Magniview 494	1.9%	10.6:1
In Focus TVT-3000	2.0%	11.0:1
In Focus System 6000	*	12.0:1
nView Luminator	*	9.6:1
nView MediaPro	3.3%	15.3:1
Proxima ColorWorks A522C	1.8%	8.7:1
Proxima Ovation A822C	3.0%	11.3:1
Sayett Mediashow	*	14.0:1
Sharp QA-1050	3.4%	12.3:1
Telex MagnaByte 1000	2.6%	9.6:1
Telex MagnaByte SC	3.3%	11.2:1

*Has built-in projector, so cannot be measured.

Percent of light transmitted.

Brightness of whitest pixel compared to blackest.

can also choose a cropping mode that lets you pan about the image to choose which 480-by-440-pixel selection to display.

Sharp's new QA-1150 panel has a 640-by-480-pixel resolution, but its display area is smaller than the QA-1050's—8.4 inches diagonally as opposed to 10.4 inches. Based on the beta unit we saw, the projected image does not seem to suffer from the miniaturization, and since the smaller format means more efficient manufacturing, the QA-1150 lists for only $4995, or more than $1000 cheaper than the QA-1050. That's as inexpensive as some passive matrix panels, and it includes a video composite adapter for TV and VCR input.

Multimedia Bound

IF A PRESENTATION IS REALLY GOING TO WOW the crowd these days, you almost have to incorporate video. Any of the panels let you display video if you already have the proper video hardware installed in your computer, but many panels come with their own composite video converters, letting you display video without extra boards or software. "LCD Panels in Focus" notes which panels offer this support.

Until recently, incorporating full-motion video into a presentation using an LCD panel was the stuff of dreams—full of blurs and barely discernible images. The refresh rate on passive matrix panels is too slow to keep up with composite video's 30 frames per second, which is why the Proxima ColorWorks is not a good choice if you plan on showing video. In Focus recently announced a soon-to-be-released passive matrix technology dubbed active addressing that promises response times well within the video range, but for right now, only the more expensive active matrix panels are fast enough (see *Lab Notes*, this issue).

Displaying video is a cinch with the nView Luminator and MediaPro, Proxima Ovation A822C, In Focus System 6000, and Sharp QA-1150 units; all five come equipped to accept composite video signals. The MediaPro makes a bid for best world traveler by allowing some obscure video formats (in addition to accepting NTSC, PAL, S-Video, and SECAM, the MediaPro can be forced to recognize PAL-M, PAL-N, and NTSC 4.43 formats), and it lets you hook up as many as four sources at a time. (NTSC is the TV signal standard in the United States, PAL in most of western Europe and Asia, SECAM in France and eastern Europe, and S-Video for VCRs.)

Optional video adapters are available for the Apollo Vision 16.7 ($1099), Sayett Mediashow ($1200), and Dukane Magniview 494 ($1000) for NTSC, PAL, SECAM, and S-Video formats; adapters are available for the Sharp QA-1050 ($300) for NTSC and PAL format; and for the In Focus TVT-3000 ($595) for NTSC format. (A new composite video adapter adding PAL and SECAM capabilities for the TVT-3000 should be available by the time you read this.)

MANY PANELS COME WITH COMPOSITE VIDEO CONVERTERS, LETTING YOU DISPLAY FULL-MOTION VIDEO FROM A TV, CD ROM, OR VCR

Setup Tips

When preparing for a presentation using an LCD projection panel, here are some important points to keep in mind.

Transport The panels are fragile, and great care should be taken in transporting them. The nView MediaPro and the Apollo Vision 16.7 come with hard carrying cases; most of the other vendors offer hard cases separately. They are a good investment. Also, avoid exposing the panel to sunlight and try not to leave it in a car. They are quite sensitive to extremes in temperature. Should the LCD panel be exposed to extreme heat or cold, leave it at room temperature at least 30 minutes before turning it on.

Overhead Projector Unless you already have an LCD panel with a built-in projector, you need to rent or buy a good overhead projector—a projector using a metal-halide bulb with at least 360 watts is generally adequate; 500 watts is better. A unit you've had for several years may run too hot and not be bright enough.

Also, make sure that the projector is a transmissive model, not a reflective one—the light should shine from beneath the panel, not reflect from above.

Screen You can, of course, project the image onto a bare wall, but a good screen greatly enhances the quality of a presentation. There are three main varieties of screen: matte, lenticular, and beaded.

Matte screens are a bit dull, but because they have a wide viewing angle, they are a good choice when there are people off to the far sides.

Lenticular screens reflect light from very thin ridges, and the image is quite sharp directly in front of the screen.

Beaded screens combine the best of both worlds, reflecting light very well and allowing a wide viewing angle.

Temperature Once you are all set up, let the LCD panel warm up for about 20 minutes before adjusting the color. It is more likely to remain constant through the presentation if you do. Also, condensation sometimes clouds the glass during warm-up.

Over time, heat may build up inside an LCD panel. They all come equipped with fans to counteract the intense heat from the overhead projector (so don't block the fan), but you may see some discoloration if the panel becomes too hot. Take it off the projector immediately, let it cool, and try again.

Also, because many of the fans on the panels are light-sensitive—they shut off when you remove them from the projector or turn off the projector—remember to unplug the panels when you are done with your presentation. Otherwise, the panels might overheat from the heat they generate internally, which could damage the panel.

LCD PANELS IN FOCUS

Company	Product	Tested by Macworld Lab	Price	Maximum Colors Displayed	Compatible w/SCSI Video Adapters (for notebooks)	Panel-to-Mac Cable Length (in feet)	Built-in NTSC Video Support	Weight (in lbs.)*	Tech-Support Score
Apollo	Vision 16.7	●	$7595	16.7 million	●	12.0	○ †	7.6	very good
	Vision 24K	○	$4325	24,000	●	12.0	○	8.0	very good
Chisholm	TFT Rainbow Model 600	●	$4295	2197	●	19.5	○	8.5 ‡	excellent
	TFT Rainbow HD Model 700	●	$5295	614,125	●	19.5	○	8.5 ‡	excellent
Dolch Computer Systems	Prism Pr1050	●	$10,581	185,193	●	10.0	●	11.6	poor
Dukane Corporation	Magniview 494	●	$7260 §	117,000	○	16.0	○	8.5	excellent
In Focus Systems	7000FX	○	$4495	24,389	●	6.0	○	9.5 ‖	excellent
	LitePro #	○	$5995	4913	●	6.0	○	19.3 ‖	excellent
	LiteProLS #	○	$7495	4913	●	6.0	○	21.2 ‖	excellent
	System 6000 #	●	$8495	16.7 million	● **	6.0	●	30.3	excellent
	TVT-3000	●	$5995 §	262,144	● **	6.0	○ †	8.7	excellent
nView Corporation	MediaPro	●	$7995	262,144	●	13.5	●	11.7	excellent
	Luminator #	●	$9995	262,144	●	6.5	●	40.0	excellent
	ViewFrame SpectraMini	○	$3695	512	○	5.7	○	9.0 ‖	excellent
	ViewFrame SpectraPlus	○	$5995	185,913	○	5.7	○ †	9.0 ‖	excellent
Proxima Corporation	ColorWorks A522C	●	$4995	24,389	●	6.0	○	6.9	very good
	ColorWorks sx A502C	○	$3995	24,389	● ††	6.0	○	15.0 ‖	very good
	Ovation sx A812C	○	$6195	24,389	● ††	6.0	○ †	15.0 ‖	very good
	Ovation A822C	●	$8495	226,981	●	6.0	●	7.1	very good
Sayett Technology	Mediashow #	●	$7795	256,000 ‡‡	●	10.5	●	20.4	very good
Sharp Electronics	QA-1050	●	$6040 §	185,000	●	10.0	●	9.7	unsatisfactory
Corporation	QA-1150	○	$4995	185,000	●	6.0	●	7.0	unsatisfactory
Telex Communications	MagnaByte SC	●	$4995	600,000	●	9.0	○	8.5	very good
	MagnaByte 1000	●	$4075 §	2197	●	9.0	○	9.6	very good

*● = yes; ○ = no. * Weight includes necessary cables and adapters. † Optional. ‡ Excluding ColorWriter color palette adapter (2.7 lbs.). § Includes price of required adapter or interface needed for Mac II compatibility. ‖ Company estimate. # Video projection unit. ** Did not work with Aura Systems ScuzzyView used for compatibility testing. †† Works only with Radius PowerView. ‡‡ Displays 4096 colors from a Mac, 256,000 from a video source.*

And what would a good multimedia presentation be without sound? In most cases, you have to rely on a VCR or other playback device to control sound. But the Proxima Ovation lets you adjust volume from controls on the panel or with a remote device, and the In Focus System 6000 and nView Luminator projection units come with volume control and built-in speakers. Apollo's optional video adapter also lets you control volume from the accompanying remote control for the Vision 16.7.

Remotely Possible

THE PANELS' HANDY LITTLE INFRARED REMOTE-control units—the equivalent of a TV's or VCR's remote control, used to adjust color values, image centering, and the like—are a definite boon when you are trying to focus or adjust the color of an image in front of an audience. (Remotes are $125 options for the Chisholm and Telex panels; the Vision 16.7 remote comes with the optional video adapter, not with the panel itself.) We also appreciated one nicety in our dark testing room: the small backlit LCD screen on the Dolch, In Focus, and Sharp remotes.

We found only one serious problem with the remotes. Though vendors often tell users to aim the beam at the screen, bouncing it back to the panel, we found that, just as in billiards, aiming directly at a target (the panel) generally yields better results than banking off a secondary object (the screen).

The nView MediaPro control panel lifts off the LCD panel to serve as a remote; this is a compact solution, but it makes sense to check the batteries before that all-important presentation, since there are no on-panel controls to rely on should the remote lose power. The MediaPro also includes a control wand that can access the panel's on-screen menus, which display LCD control options like image centering. (These menus appear on the projection screen, not on the Mac's display.)

Most remote controls merely duplicate the image controls on the projection panel (you still have to run the presentation using the Mac's mouse and keyboard), but the Proxima Ovation remote comes with software that lets you navigate a presentation without touching the computer. If you opt for the deluxe Telex RPC-1 $649 remote mouse or the $325 Smart Remote from Sayett, you can control the computer from a distance, not just the panel.

The optional $749 Cyclops from Proxima is not a toy, although your kids might mistake it for one. Shaped a bit like a sci-fi gun, the Cyclops sports a trigger and is nearly a meter long. Besides serving as an infrared pointer, it can substitute for the Mac's mouse when navigating a presentation.

Added Attractions

SEVERAL VENDORS OFFER UNIQUE FEATURES THAT further distinguish their products. For example, Dukane's Magniview 494 includes a feature that makes a lot of sense: a drive for special 2-inch floppy disks that hold up to 800K of formatted information recorded from the Mac by the LCD panel. Record your presentation back at the office and you don't have to lug along the computer. Another ben-

efit of this scheme is that you don't have to twiddle with the panel's various controls during the presentation. You do that when capturing the images to the panel's disk.

If you're taking your presentation and Mac—perhaps a PowerBook—on the road, it might be nice to have a color monitor along. The Dolch Prism comes with a backlit cartridge that slips behind the LCD panel, making it into a monitor. Connect it to your Mac, and you can edit that color presentation in your hotel room. The display quality is comparable to that of a standard CRT monitor.

For those who would like to place electronic annotations and simple color drawings over the projected images, Chisolm offers the ColorWriter, an eight-color tablet and pen that connects to both the computer and the LCD projection panel. Almost a small graphics computer itself, the ColorWriter turns into a whiteboard for brainstorming or transforms into a patterned screen that hides and reveals portions of a projected image. ColorWriter prices range from $2495 for the basic product to $4495 for additional processing abilities that let you build custom icons—to turn the on-screen arrow into the company logo, for example.

The Hitch

THE ADVANTAGES OF ACTIVE MATRIX TECHNOLOGY over passive matrix are many: broader color range, better contrast ratio, faster response times, and wider viewing angles. The disadvantages can be distilled down to one point: price. Active matrix technology is extremely difficult to manufacture. Because each panel with a resolution of 640 by 480 pixels has three transistors (one each for red, green, and blue) at each site, there are 921,600 points at which a panel can go bad. And a few always do. Consequently, some vendors state the usable dot ratio for their product. For example, those citing a 99.996 percent figure are saying that up to 37 pixels on the panel may be permanently inactive when you buy it. The greatest number of allowable defects cited in our sample was 50 possible inactive pixels.

ITS BACKLIT CARTRIDGE LETS THE DOLCH PRISM PR1050 DOUBLE AS A PORTABLE MONITOR THAT YOU CAN USE IN YOUR HOTEL ROOM

This is not a problem for fast-moving images. Hand-held TVs with 2-inch LCD screens may have as many as 20 percent of their pixels on the blink and you won't really notice. But with static images generated for computer-based presentations, a tiny white spot here or there can be annoying. At worst, that spot may obscure a decimal point in your set of sales figures.

Even though a few inactive pixels are tolerable, many panels that roll off the production line exceed the allowed limit and must be discarded. The subsequent low yield of panels that pass the muster means higher prices.

On with the Show

ASSUMING YOU'VE ELECTED TO SPRING FOR an LCD projection panel, there are a few final points you ought to consider. If your decision is driven by budget, check out the Telex MagnaByte 1000 and Chisholm TFT Rainbow Model 600, but bear in mind that their remote controls and carrying cases are optional. The Apollo Vision 16.7 was the easiest panel to set up, being preconfigured at the factory, but you don't have much control over the image. If you'll be heading for sites that might not have easy access to appropriate overhead projectors, consider one of the panel-plus-projector units (see "Setup Tips").

Finally, given the rapid improvements in LCD flat-panel technology, it's worth noting that it might not be long before these panels replace our loud, bulky, power-hungry CRT displays. The color is vibrant, crisp, and flickerless, and there are no extremely-low-frequency emissions to worry about. Until then, presenters who choose LCD technology will be the main beneficiaries. m

See *Where to Buy* for contact information.

SUZANNE STEFANAC is a contributing editor to *Macworld* and she looks forward to the day when flat-panel liquid crystal displays are the norm.

Macworld Lab testing supervised by CHIP CARMAN.

MW EDITORS' CHOICE

Low-Cost Panel

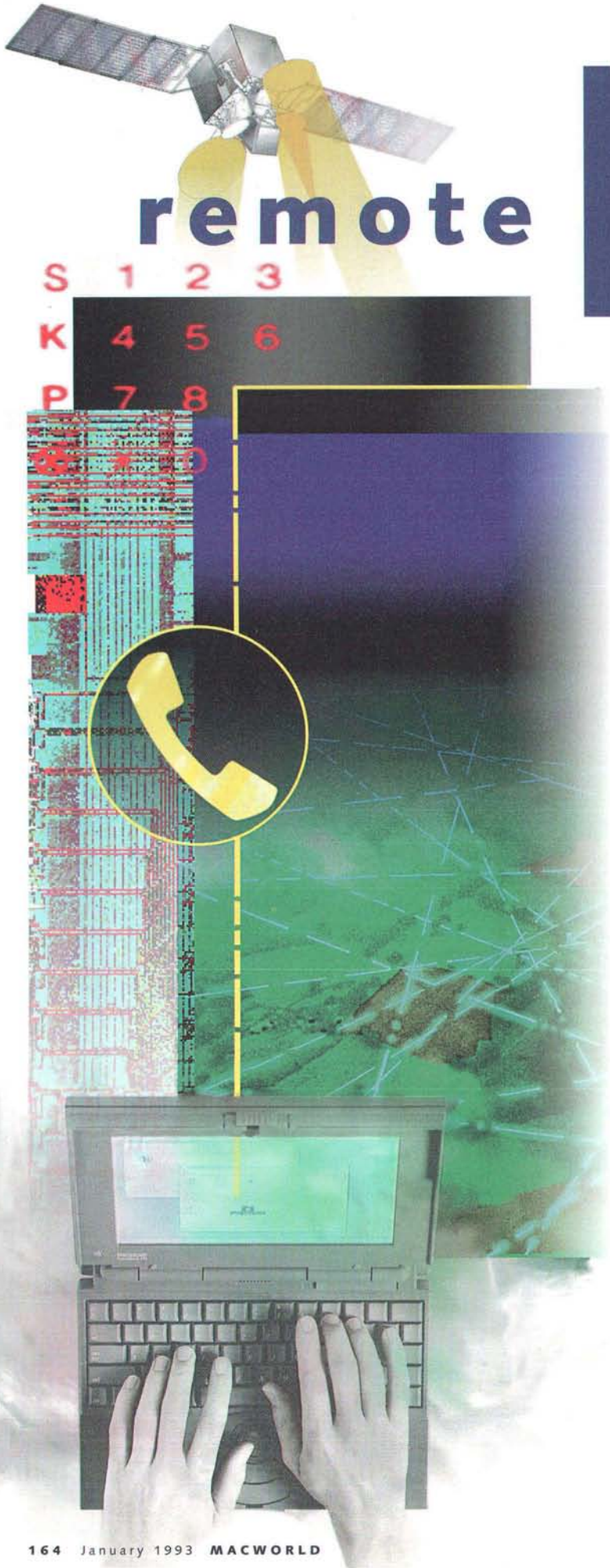
TFT Rainbow HD Model 700 If you want high image quality at an affordable price, you'll find that this panel offers high-fidelity color, excellent text display, and easy setup; but it has no composite video option. **Company:** Chisolm. **List price:** $5295.

Best-Display Panel

MediaPro This unit boasts crisp images, well-integrated controls, a wide range of composite video standards, and informative documentation; the only potential negative is that the MediaPro is relatively expensive. It's a top choice if image quality is your top concern. **Company:** nView Corporation. **List price:** $7995.

Complete LCD Projector

System 6000 If you seek an LCD panel with a built-in projector, this unit offers a good design, excellent color, and good image quality, even with its small screen's requirement that images be compressed or cropped. **Company:** In Focus Systems. **List price:** $8495.



remote possibi

IT'S HAPPENED TO YOU A THOUSAND TIMES. You're deep in the equatorial jungle making a presentation. Suddenly you're captured by cannibals who speak only Kbonji, and you're thrown into a crude bamboo hut. As the frenzied cocktail-hour drums pound louder, you remember that you have an English/Kbonji-dictionary HyperCard stack—on your Mac back home in Hoboken, New Jersey. Clutching your PowerBook, you stare longingly at the lone phone jack in the corner of the cell. If only you had that dictionary now!

Because of a technology called *remote-access computing,* that kind of story always has a happy ending. Using a modem and a program called AppleTalk Remote Access (ARA), you can dial in to another Mac, wherever in the world it is, and get stuff from it. Or read E-mail, transfer files, or even use programs on the faraway Mac.

That means you no longer need to nervously pack up the PowerBook for each trip you make, racking your brains to make sure you've copied everything you'll be needing from your main Mac. If you forget a file, you can always phone home. And remote-access computing has even bigger implications if your office has networked Macs; you can dial in not just to an individual computer, but to the entire network, and use any equipment that's part of that network. Distant Macs show up on your screen as normal icons, as though each were simply another hard drive attached to your PowerBook. The whole thing, once it's set up, is amazingly simple.

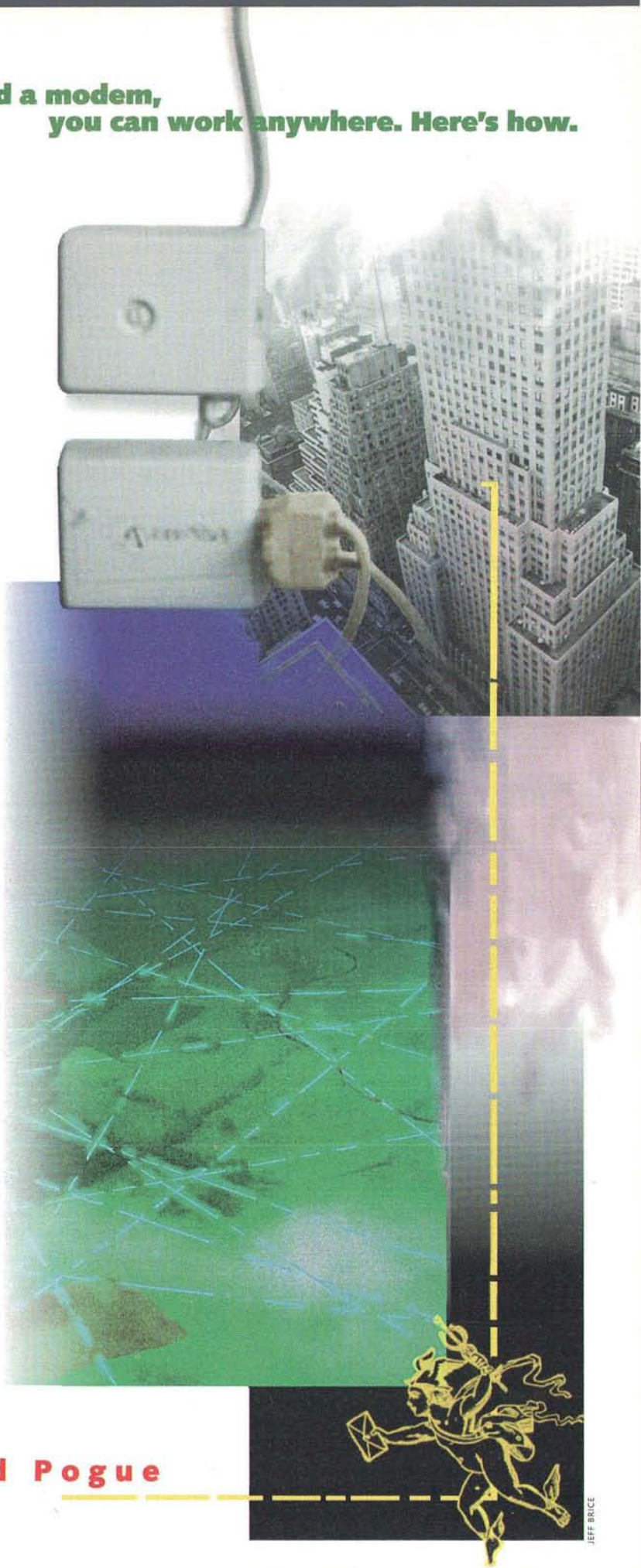
Home-Office Hardware

OF COURSE, "ONCE IT'S SET UP" IS THE operative phrase. Let's begin with the simplest scenario. You have one Mac at home and a PowerBook on the road. Security isn't much of an issue—you doubt that some hacker is going to crack your modem's phone number, dial in, and download your last six grocery lists.

If that's your situation, your first task is to equip each of the two Macs with a modem (a telephone hookup). Today's modems come in three standard speeds: 2400 bps (bits per second, also called *baud*), 9600 bps, and 14,400 bps. The slowest ones cost as little as $90, but they can be frustrating to use for remote-

lities

With a PowerBook and a modem, you can work anywhere. Here's how.



JEFF BRICE

access purposes. If you want the remote Mac to respond to your actions without a 20- or 30-second delay, you need at least 9600-bps modems, which you can get for around $300 each. People who frequently call in from the road will tell you that it's worth paying $400 apiece for the third, still-emerging flavor of modems—14,400-bps—which really makes ARA sing.

If one of your Macs is a PowerBook, you may find life easier if its modem is built in. You save a lot of size and weight, don't have to plug in some 5-pound black power-adapter cube, and don't have to remember to pack the modem's various pieces when you go traveling. Global Village makes both 9600-bps and 14,400-bps internal PowerBook modems, called the PowerPort Silver and PowerPort Gold, respectively. You probably don't need me to point this out, but when two modems with different speeds connect, they communicate at the lower speed—so don't buy one 9600-bps modem unless the second modem is also 9600 bps. And while you're shopping—don't pay any extra for fancy features like V.42bis or MNP Class 5; part of the beauty of Apple's ARA software (which comes free with each PowerBook) is that it has similar features built in. (V.42bis and MNP Class 5 are data-compression protocols, which make transmitted data take less time to send over phone lines.) And one final thought on modem purchasing: the ARA software requires a special piece of software (a *script*) that's customized for your exact modem model. ARA comes with 15 scripts, and others are available from various modem manufacturers—but make sure a script for your modem exists, somewhere, before you buy an off-market el cheapo modem.

Once your Macs are decked out in matching modems, you have to worry about the phone line at home. If you have a separate line for your modem, terrific. If not, you need to buy a voice/modem *line switcher*. It's a little box that acts as a smart phone operator; when a call comes in, the line switcher automatically detects who's calling—a person or another Mac—and routes the call to the phone or the modem accord-

by David Pogue

SCOTT PETERSON

Shiva's LanRover/L dial-in server lets PowerBook users access remote networks.

ingly. Various electronics mail-order catalogs carry these switchers.

Your hardware travails aren't over yet. Unless you're an environmentally reckless soul who relishes high electric bills, you probably won't want to leave the Mac on, awaiting calls from your PowerBook, during your entire six-week trip to the Alaskan tundra. Your next thought, therefore, should be "How can I turn on the home Mac from wherever I am—and shut it off when I'm done remote accessing?"

You have two choices. First, you could buy a PowerKey Remote—a 1-inch, inconspicuous $49 gadget from Sophisticated Circuits that goes between your Mac and the modem. When a call comes in, the PowerKey Remote turns on your Mac, and you're in business. The PowerKey Remote comes with a software control panel that automatically shuts down the Mac after you've hung up. If you have an LC model, or a one-piece Mac like a Classic, you also need the regular $119 PowerKey—a surge-protected multiple-outlet box that lets you turn on the Mac from the keyboard. Actually, even Mac II–series or Quadra users should consider the PowerKey; it lets your phone call power up not just the Mac, but any attached hard drives, SyQuest drives, CD ROM drives, or other peripherals.

Your second option is Farallon Computing's $49.95 Remote/WakeUp Cable, which goes between any modem and a Mac II– series machine or Quadra so that, once again, a phone call can turn on the computer. The cable comes with an auto-shutdown control panel.

Software for the Solo Operator

ALL RIGHT. YOU'VE GOT ALL THE HARDware rigged. A modem is installed in your PowerBook, which calls your home number. The voice/modem line switcher routes the call to the Mac, where there's a second modem; the call wakes up the Mac, turning it on automatically.

At this point, you will have accomplished absolutely nothing useful unless you've also set up the software correctly. AppleTalk Remote Access requires System 7. It uses System 7's file-sharing feature, which lets you designate which disks, folders, and files you want to make visible to remote accessers. Finally, you have to prepare the home Mac for receiving calls. There are so many steps to this process that you should consult, clip, and save "The Macworld Remote Access Cheat Sheet" for details. Suffice it to say that you should test the arrangement from your next-door neighbor's house before leaving for the airport, just in case you have omitted any small part of the software setup. There's nothing worse than being in Borneo, dialing Dallas, waking up your Mac, seeing its hard drive icon appear on your screen, and then realizing that you failed to turn on File Sharing for the folder that contains your vital documents.

Of course, Apple didn't invent remote-access computing, and ARA isn't the only software that can bring about this wonder. Farallon's PhoneNet Liaison, for example, doesn't just connect a PowerBook to a remote network—it connects an entire network to another network at a remote location. And if the remote Mac will be manned instead of unmanned—that is, if you want to train somebody from afar, or collaborate on a document simultaneously, or otherwise require the next best thing to being seated there—then consider a *remote-control* program. There are two: Farallon's Timbuktu/Remote, and Microcom's Carbon Copy Mac. Instead of just seeing and manipulating files on the remote Mac, these programs let you manipulate the Mac itself: as you watch the remote Mac's screen in a separate window, you can move its cursor, choose menu items, and so on.

The advantage of these programs is that they don't require System 7, as ARA does. The disadvantage is that they're not free: PhoneNet Liaison is $395 (you need two copies if you want to dial in from either network); Carbon Copy Mac is $99.95 for two copies, $299 for an entire network zone's worth; and Timbuktu/Remote is $195 per copy, $295 for a pair.

Moments of Truth

ONCE THE HARDWARE AND SOFTWARE are rigged, everything's easy. Make your flight. Check into the hotel. Have a $5 Snickers from the minibar. Plug the PowerBook's modem into a phone jack—if there *is* a phone jack. (Unfortunately, all too many hotels feature Eisenhower-era phone technology, where the cord is permanently fastened to the wall instead of having a handy plastic clip-jack. In that case, your remote-access experiment is doomed.)

Double-click on the ARA icon. Type in your name; whatever password you

Replacing AppleTalk Remote Access

If you think the dialog box pictured below is the AppleTalk Remote Access program, look more closely. It's actually the impressive shareware control panel, ARA Client (Ron Duritsch, 6982 Devon Dr., Middletown, Ohio 45044; $20 requested).

What's the point of having a control panel that almost precisely duplicates the look, feel, and functions of ARA? Size, primarily: ARA Client takes up only ⅙ as much disk space, and uses ⅛ as much memory, as the ARA program from Apple.

Despite its compact size, ARA Client does everything the ARA application does, and more. It can redial a busy number. It lets you create Connectors—double-clickable connection documents that completely automate the dialing/connection process (and bypass not only the ARA program, but even ARA Client itself). Pop a Connector into your Apple Menu Items folder, and you can hook up to a remote Mac simply by choosing the Connector's name from the Apple menu.

ARA Client simply replaces Apple's ARA *program*—not any of the other parts of the Apple ARA kit (such as the control panels and modem scripts). Therefore, you still need to own AppleTalk Remote Access. But it's hard to imagine a downside to this leaner, meaner front end to Apple's behind-the-scenes magic.

The Macworld Remote Access Cheat Sheet

I. SETTING UP THE HOME-BASE OR OFFICE MAC

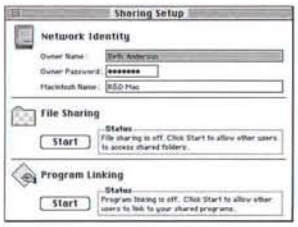
1 The home-base Mac needs a modem, System 7, and File Sharing. If you didn't install File Sharing, insert the first Install disk of the System 7 floppy-disk set. In successive dialog boxes, click on OK; Customize; File Sharing; Install.

When everything has been installed properly, you'll find about ten new files in your System Folder, or in folders therein.

2 Insert the AppleTalk Remote Access Installer disk, and double-click on Installer. Click on OK, then Install. When the installation process is over, your home-base Mac's System Folder will contain two dozen more files, control panels, and specific modem modules (scripts) that, collectively, take up 5.7MB.

3 Restart the Mac.

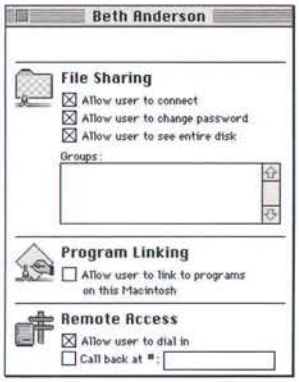
4 From the Apple menu, choose Control Panels. Double-click on Sharing Setup. In the Sharing Setup dialog box, enter your name, a password (optional—if you enter one here, you'll be asked for it every time you try to access this Mac), and a name for the Macintosh. *Remember your owner name and owner password!* If you try to dial in later and don't type this information precisely, you won't be granted access to your own Mac.



5 Click on the Start button in the File Sharing section. Eventually, the button will change to say Stop. When it does, close Sharing Setup.

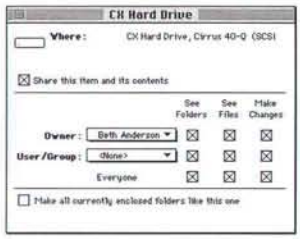
6 Open the Users & Groups control panel. Double-click on the icon representing your own name. In the dialog box that appears, determine how much access you want to give yourself.

Be sure you select "Allow user to dial in" in the Remote Access section. If, for security purposes, you want the Mac to call you back at a certain number (instead of letting you in when you call), select "Call back at #," and enter the phone number where you'll be.



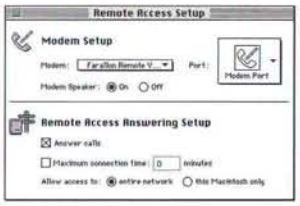
If you want to grant access to others, open the Users & Groups control panel, and choose New User from the File menu. Double-click on the resulting icon, and repeat step 6. If security isn't an issue, also repeat this process with the Guest icon, and select "Allow guests to dial in"—but understand that anybody with a modem can now access your Macintosh.

7 Click once on your hard-drive icon and, from the File menu, choose Sharing. In the dialog box that appears, select "Share this item and its contents." Specify the level of access you want each user to have. Close the window, and save changes.



Repeat this step with any other disks or folders you'll want to access.

8 Open the Remote Access Setup control panel. From the pop-up menu, specify the model and brand of modem attached to the home-base Mac. Make sure "Answer calls" is selected.



If you have an automatic-shutdown program, set it up now.

The home-base Mac should now be ready for action.

II. USING THE POWERBOOK FOR REMOTE ACCESS

1 Install AppleTalk Remote Access, as described in step 2 above.

2 Open the Remote Access Setup control panel. From the pop-up menu, specify the model and brand of modem attached to or installed in the PowerBook.

3 Double-click on the Remote Access program icon.

Enter your name and password exactly as you entered them in step 4 of part I. In the Phone blank, enter the phone number of your home-base Mac's modem. (In this illustration, the number is preceded by 8—to dial out from a hotel room—and a comma, which makes the dialing process pause for 2 seconds.) If you're not worried about the security risk, select "Save my password," so you won't have to retype it each time you call in. Choose Save from the File menu, so that you create a connection document you can reuse.

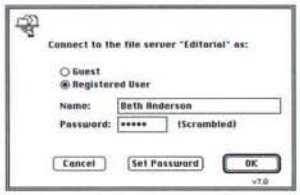
Click on Connect.

4 Watch the Remote Access Status dialog box.

When you've successfully connected, the Status line will display the name of your home-base Mac. Don't forget to allow plenty of time for the home-base Mac to start up.

5 From the Apple menu, select Chooser. Click on AppleShare. On the right, you'll see the name of your Macintosh (and any other Macs on the remote network). Double-click on the one you first want to access. A dialog box appears.

6 Once again, enter your name and password, or click on Guest (if, in step 6 of Part I, you established access privileges for the Guest icon). Click on OK.



7 Now you see a list of any disks or folders available for file sharing. Double-click on the one you first want to access.

The drive's icon should now appear at the right-hand side of your PowerBook screen, where you can open it and use its contents as usual.

To save time, select the drive's icon now, and choose Make Alias from the File menu. Next time you want to dial in, just double-click on the alias; you'll be able to skip steps 2 through 5.

gave yourself; and your home phone number, beginning with whatever digit is required to dial out of the hotel (usually 8). Choose Save from the File menu to create a *connection document*, so that you won't have to type in all this information the next time you want to phone home.

Finally, click on the Connect button. The modem's screeches and hisses will signal you when it's successfully made contact with your home modem. (Your luck will vary, depending on the quality of the phone lines. Don't expect a 100 percent success rate for overseas remote access.) You won't immediately see your Mac's name appear, though, because of the amount of time it takes the typical Mac to start up. Depending on what kind of system-extension fanatic you are, this loading process could take a while. In fact, you may even find that ARA gives up waiting for the home Mac to come online, and disconnects. It's nothing to worry about; at least you've successfully turned on the home Mac. Dial it a second time, and you're all set to go.

As directed on the *Macworld* cheat sheet, you're now supposed to open the Chooser, click on the AppleShare icon, and select the Macintosh on which the disks or folders you want to peruse are located, entering a password for each (if you've set them up that way). They'll appear at the right side of your screen. Here's an important time-saver: if you think you'll ever be calling your home Mac again (and I doubt you'd have spent $1000 on modems and hardware if you didn't), make aliases of these disks and folders. The next time you need to sign on, just double-click on a disk's alias. Just as any Mac prompts you to insert the correct floppy disk when you double-click on its alias on your hard drive, ARA remembers how it's supposed to reach a remote drive: by dialing your home Mac, making the connection, bypassing all that AppleShare business, and bringing the drive online.

Once you're connected, you've really accomplished two things at once. First, you've connected to your network, even if your entire "network" consists of one Mac at home. That means you can use any equipment attached to the network—laser printers, for example—or run any network-savvy software, such as Claris's FileMaker Pro, On Technology's Meeting Maker, or (most important) E-mail programs like CE Software's QuickMail. These "network services" are available even if you didn't turn on File Sharing to make a drive's contents accessible.

If you did turn on File Sharing, you can also do anything to your files that you'd do if your home-Mac drive were attached to your PowerBook locally: open folders, trash or copy things, open and edit files, and so on. Each time the Power-

Plugging the Security Holes

Unless you're the person in charge of an office network somewhere, you might reasonably wonder what the fuss over remote-access security is about. It might seem as though there are plenty of obstacles to unauthorized remote-network burgling. Obstacle #1: The intruder would have to know the phone number of the network modem. Obstacle #2: That person would also have to know the precise name and password of a legitimate user. Obstacle #3: Somebody has to have explicitly set System 7 to share the contents of any drive or folder containing sensitive files—and, furthermore, to share them with that particular user. Yet network administrators worry plenty. Their nightmares run along the following lines:

Figuring out a company's modem phone number isn't such a big deal to a patient invader who's willing to try a few combinations.

To obtain the phone number *and* a legitimate user name *and* a password, someone could steal your PowerBook—or just copy the AppleTalk Remote Access connection document aboard it. (Moral: For maximum safety, don't use the "Save my password" checkbox in the ARA welcome screen. Instead, always type in your password.)

ARA has another security feature, called call-back. When you phone your network, ARA disconnects you and promptly calls you back, using a predetermined number. In theory, this system should prevent anybody but you from logging in. In practice, though, having the office Mac call you at a single number doesn't work well—first of all, you're likely to be moving from place to place as you travel; and second, the Mac can't call you directly in a hotel room, since it would first have to speak to the hotel operator.

There are two levels of access involved in using ARA. First, you dial in to your *network,* where you have access to network services such as laser printers, E-mail, and network-accessible databases like FileMaker Pro. The second level of access: if Macs on your network have File Sharing turned on, you can actually open and edit individual documents on their disks.

Here's the greatest gaping hole of all. For both access levels, there's a special account called the Guest account. This account requires no user name and no password for access. Using the Users & Groups control panel, you can turn Guest access on or off independently for dial-in access and access to files. If the "Allow guests to dial in" checkbox is selected, anybody with a modem and ARA (without any idea of what a legitimate user name or password might be) can connect to your network, rename or tie up your laser printers, browse your network databases, dial out through your fax modems, and so on—even if Guest access to your files themselves isn't turned on. The moral here: Make sure every Mac on the network has both types of Guest access turned off.

Some security-conscious people mutter about Apple's failure to make ARA more secure. They gripe that there's no way to vary a password over time, no way to trace an intruder, and so on. Still, the *R* and *A* in ARA stand for remote *access;* the program is designed to make remote networking as simple, not challenging, as possible. ARA was not designed to be a company-wide program; with ARA's licensing limit of three Macs per copy, it's clear that Apple meant ARA to be a personal solution. (The dial-in network servers from Shiva and Cayman Systems promise higher levels of security than does ARA alone.)

In any case, to protect the network, first eliminate the human holes: (1) make remote users type in passwords manually; (2) at the office, turn off File Sharing for sensitive folders; and (3) most of all, turn off Guest privileges (using the Users & Groups control panel) for each Mac.

Even though you can take those precautions, the companies that make Macintosh security products hope you're still worried—they've got an arsenal of added-security gizmos to sell you, ranging from software-based Mac lockers to card-size password generators that change the password many times a day.

If you are *still* worried, just unplug the modem and forget about remote access.

Book needs to access the remote Mac, you'll see a little ⇆ icon flicker in the upper-left corner of the PowerBook screen, and you'll notice a certain sluggishness (even at 9600 bps). If you can wait an ice age or two, you can even run programs that reside only on the remote Mac.

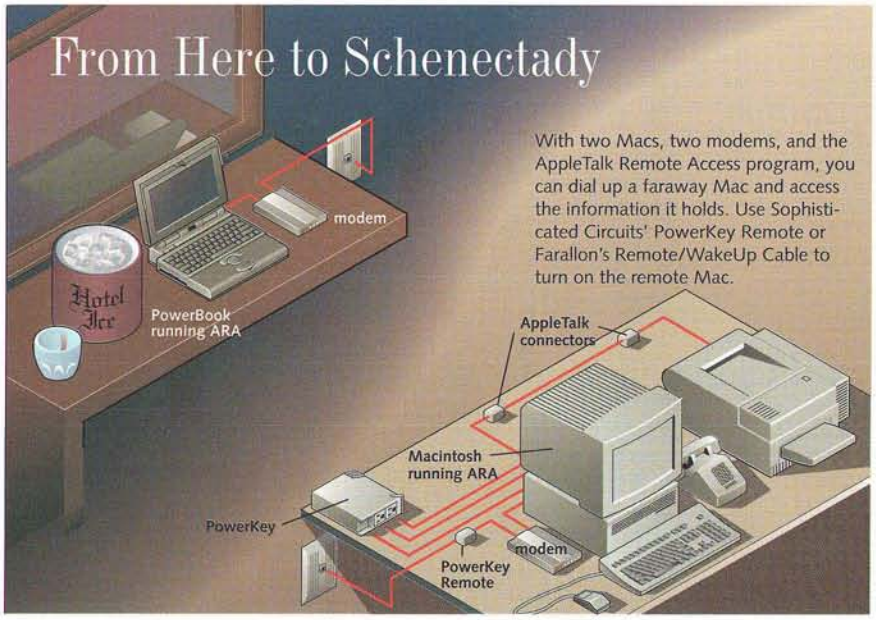
Office Alternatives

THAT'S ALL DANDY IF YOU'RE A ONE-person operation. But what if you work in an office? What if the point of remote-accessing is not to retrieve something you've forgotten, but instead to work in your bathrobe at the kitchen table without even going into the office? (The word for this increasingly popular practice is *telecommuting*. The other term for it is *having a blast, as long as you've got the self-motivation and can keep the English muffin crumbs out of the keyboard.*) More perplexing still: what if there are a bunch of you, all floating around the countryside with PowerBooks, and all of you need to dial in to the office every day?

One possibility, of course, is to take the personal approach described above and run with it—just multiply the number of phone lines and other gear times the number of participants. But since your office Mac is likely to be hooked, via network, into everybody else's Macs, somebody is going to start worrying about security. In fact, some people worry a lot about security; some big companies, in fact, hire a full-time specialist who does nothing but worry about remote-access security issues. Other companies, leery of making trade secrets vulnerable to any outside hacker (or rival) with a modem, have forbidden the use of ARA altogether (see "Plugging the Security Holes").

Here's another problem with using AppleTalk Remote Access on a network. The ARA software has all kinds of sophisticated programming to speed things along: compressing data, checking for errors in transmission, and so on. In processing all these data manipulations, the home-base Mac has its silicon hands full. If somebody at the office has to use that Mac while you're connected to it, forget it—the office Mac will have all the pep and vigor of a slug on Sominex.

The security and speed problems of ARA on a network, however, pale in comparison with the task of the network administrator, the poor soul responsible for keeping the connected Macs safe, speedy, and running. As you'll see in the *Macworld* cheat sheet, you have to prepare the Mac using the Users & Groups control panel, which lets you identify, by name and password, the people to whom you want to allow access. Trouble is, you have to set up these names and passwords on each *individual* Mac, one at a time. Every time a remote-access user is added to or deleted from the list—or there's a change in somebody's level of access privileges—the network administrator must scurry from one Mac to another, making the change to each Users & Groups file.



From Here to Schenectady

With two Macs, two modems, and the AppleTalk Remote Access program, you can dial up a faraway Mac and access the information it holds. Use Sophisticated Circuits' PowerKey Remote or Farallon's Remote/WakeUp Cable to turn on the remote Mac.

High-Tech to the Rescue

AS IS ALWAYS THE CASE IN THE WORLD of Macintosh, a little money can buy a solution to these problems. One answer is the Shiva LanRover/L. It's an electronic gadget that you connect between your office modem and the network. The LanRover has the ARA software built into its circuitry. Since the host Macs don't have to be running ARA (or even System 7), they don't do all of the data processing necessary for remote access to work, so they don't slow to a crawl when some PowerBook user in the Midwest dials in. A second advantage: the LanRover's software contains its own version of the Users & Groups control panel—and it's all in one file. To change the user list (or a password), the network administrator has to modify the LanRover's User List file just once (not once per Mac). And when you've got the LanRover up and working, it lets you share your office modem over the network to access online services like AppleLink and CompuServe.

The LanRover, then, is a $699 solution to some of the ARA network problems—for small AppleTalk networks, anyway. Problems remain for larger (or EtherTalk-wired) networks; but new products are already in the pipeline to solve them. Cayman Systems' $1895 GatorLink does everything the LanRover does—but can also permit three modems to be attached, so that three remote users can be connected to the network simultaneously. Shiva's LanRover/E permits either four ($1999) or eight ($2999) users to be connected at once, and (like GatorLink) has an EtherTalk connector to accommodate that faster type of network wiring. (Both products should be available by the time you read this.)

Not So Remote

ONCE YOU'VE SET UP THE HARDWARE and software, you'll be astonished at how easy remote-access computing is. With one double-click, within a minute, you feel like you're home again (or at work again, as the case may be). The hardware may cost you something, but the software—System 7 and, if you have a PowerBook, the ARA software—doesn't cost a penny.

When you hook up to a Macintosh a continent (or a subway ride) away, your mind will certainly race: think of the possibilities! If a person can be productive without actually having to *be* somewhere specific, society's conceptions of the workplace, the workday, and even working in general will have to change. Remember these not-so-remote possibilities the next time you're stranded in the jungle—concrete or otherwise. ■

See *Where to Buy* for contact information.

As this article went to press, *Macworld* learned that Apple is no longer including a free copy of AppleTalk Remote Access with PowerBooks. ARA is now available for $199.

Contributing editor DAVID POGUE is the author of Macs for Dummies (IDG Books Worldwide, 1992), and is a leading authority on phone-jack technologies in cheap American hotels.

2-D CAD packages have become flexible tools for artists as well as engineers

2-D CAD Broadens Its Scope

BY ANN MEYER

The lines are blurring between illustration and design; architects, engineers, and illustrators should all take a look at the latest CAD applications. CAD (computer-aided design) is primarily used to prepare technical specifications for buildings, automobiles, and other products. But the better CAD packages now feature a number of special design tools, including font outline curves, Bézier curves like those in Adobe Illustrator and Aldus FreeHand, the ability to place encapsulated PostScript files the way desktop publishing packages do, and 32-bit color support.

For many, the word *CAD* conjures up the image of a program that requires months of specialized training and expensive peripherals, such as digitizing tablets and pen plotters. But the Mac experience has opened developers' eyes to a variety of tools and techniques, many of which make CAD easier to learn and use, and less expensive to implement.

As more artists and illustrators try out CAD, they may find themselves wondering how they lived without *geometry* and *snap* features. Geometry features make it possible to draw circles by radius or diameter, to construct parallels to existing objects, to produce tangents and perpendiculars, to generate mirror images across any line, and to extend lines to a common endpoint or trim them at their intersection. It is much easier to create an arch between two columns by drawing a diameter circle, for instance, than by drawing a bounding box for the circle.

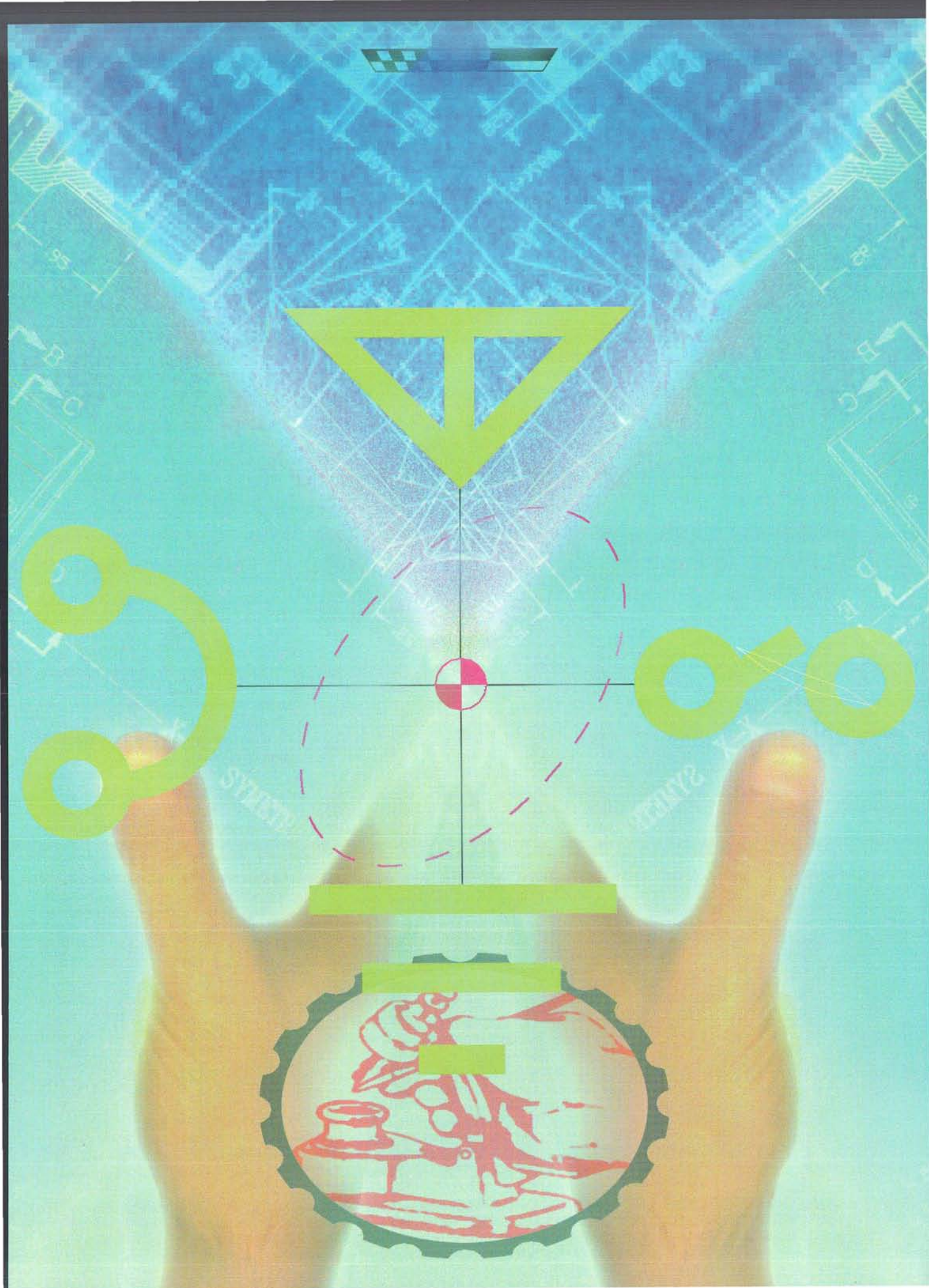
Snaps make it possible to attach lines, circles, and other entities directly to the ends of other lines, to the vertices of polygons, to the centers of lines or circles, to the point where objects intersect, or simply along the edge of an object. When you use snaps, you shouldn't see gaps between objects (or lines extending slightly past other lines) no matter how close you look, even when you print to a 3000-dots-per-inch imagesetter.

The better CAD packages are faster than Illustrator and FreeHand when working with complex files. Moreover, architects and engineers will find that they don't have to accept inferior programs to take advantage of the Mac's ease of use. A few Mac-based CAD packages provide features that rival counterparts on other computer platforms.

What Makes a Good CAD Package?

3-D SOFTWARE HELPS SELL CLIENTS ON A PROJECT, but CAD users need a strong 2-D foundation. Designs are generally conveyed to builders via 2-D plans and elevations—the clear and succinct way to show construction information. CAD users revert to 2-D for dimensioning, to sketch out proportions of a de-

ERIC ADIGARD/MAD



sign when a 3-D shaded view would take too long to prepare, and to create elements that are difficult to draw in 3-D packages.

Architects and engineers must create drawings to scale, and it's easier to design a 60-foot building in a program where the rulers (or numeric display) actually say 60 feet than to draw it 15 inches long at ¼-inch scale. Since builders often measure from blueprints, the final drawing must be printed or plotted precisely to scale as supported by the better CAD programs.

It helps to have good translators so that users of different packages can share drawings (see "Translation Navigator"). Most CAD packages include or offer an optional translator for AutoCAD's DXF format. A few offer support for IGES (Initial Graphics Exchange Specification—a format common in workstation CAD programs that is sponsored by the National Bureau of Standards) or make direct translations between specific packages. Many users want translators to products such as Illustrator; a few CAD packages even have illustration features such as a blend tool and commands for fitting text to a curve and converting fonts to outline curves.

A few CAD developers, including Graphsoft, Engineered Software, Intergraph, Ashlar, and Innovative Data Design, have added support for viewing 32-bit raster images so that users can trace data from satellite images and other graphics scanned into the computer. Features such as autoscrolling make it easy to use the mouse to trace highly magnified views of images that might once have been traced on a digitizing tablet. Because users can scan an image in, then compare both the scanned image and tracing on screen, they can correct mistakes they might not have noticed using a tablet, which shows only the tracing on screen.

Of course, CAD users also want features commonly found in drawing and illustration packages, including symbol libraries, fill patterns, adjustable line attributes, PostScript and TrueType fonts (preferably with the tab, indent, and superscript and subscript features currently offered by packages such as MacDraw Pro), addition and subtraction of filled polygons, and the ability to convert polygons to lines and to convert Bézier curves to smoothed or unsmoothed polygons.

CAD packages should also offer layers (all of those reviewed here do) and should enable users to rotate, move, or rescale selected objects from multiple layers at once—operations that most drawing packages can't handle. An architect might put the outside walls of a building on one layer and establish ten layers per floor for items such as interior walls, plumbing, and electrical wiring. It would take an impractically long time to move or replicate the entire building to a new postion if each layer had to be handled individually. On the other hand, architects also need the ability to select a single layer while displaying multiple layers (see "CAD Databank").

Midrange and high-end CAD packages often provide macro programming features, enabling third parties and sophisticated users to automate specialized tasks for specific markets. Architects want features to speed door and window insertion. Contractors need tools for estimating costs based on the lengths of walls; number of doors, windows, and fixtures; and length of plumbing lines.

Facilities managers need database connections to track the location of office furnishings and equipment with their serial numbers and value. Mechanical engineers may need tools to generate computer numerically controlled (CNC) code for computerized milling machines, or to automate tasks such as drawing gear sprockets. And many users depend on good connections between CAD and desktop publishing packages for producing technical manuals.

The latest must-have feature, offered in Ashlar Vellum, Autodesk's AutoCAD, Forthought's Snap, and Intergraph's MicroStation Mac, is reference files. Reference files allow users to view and edit a drawing (or portion of a drawing) within other drawings, then automatically update drawings or layers. A detailed view of, say, part of an electrical wiring system can be shown on the same drawing with a view showing the wiring layout in the structure without users' having to draw the wiring system twice.

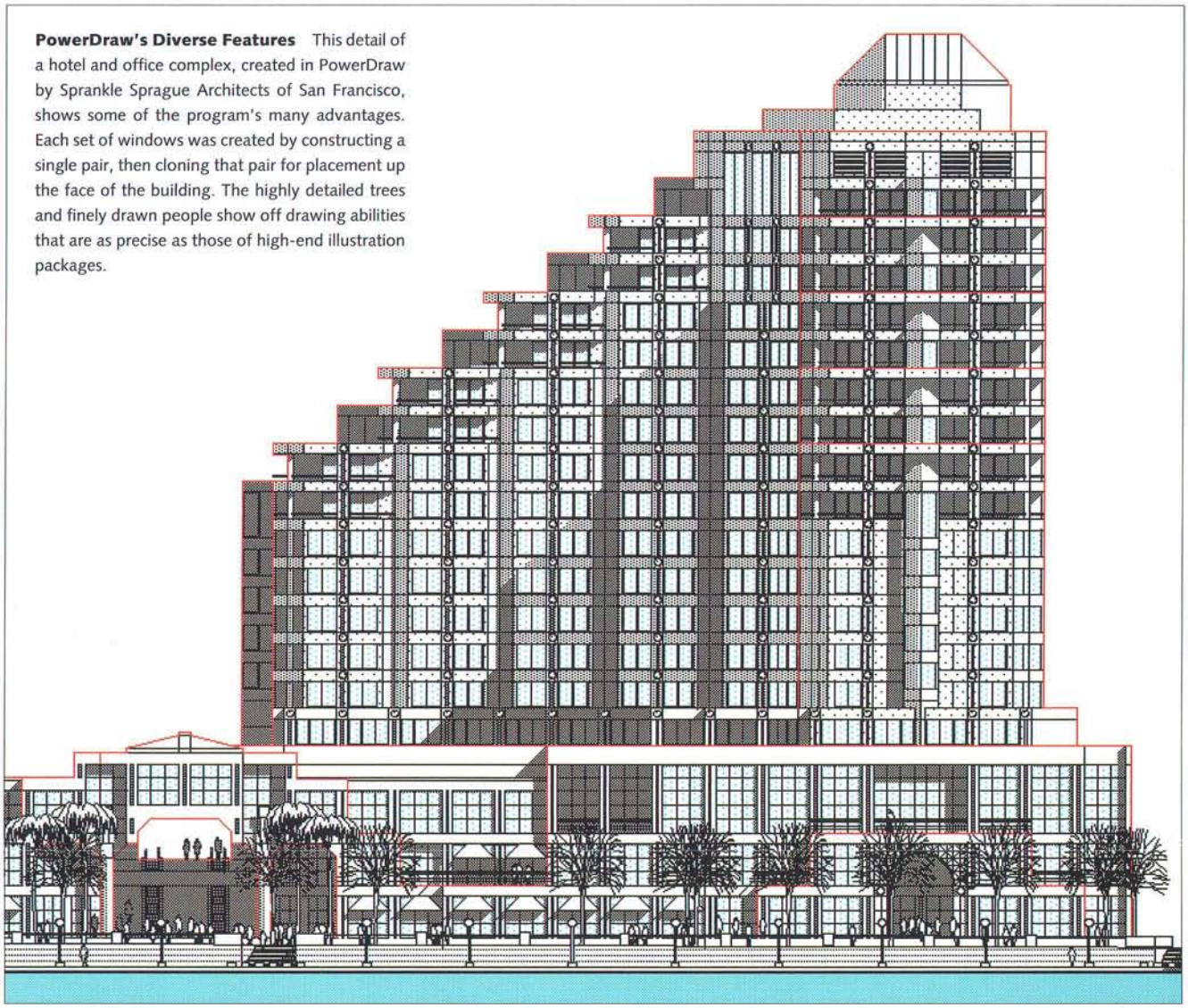
Reference files can also be shared over a network. A number of users—for example, the different people designing

TRANSLATION NAVIGATOR

	CADMover ($495)	Claris Graphics Translator ($299)	PowerDraw Translator ($275)
3-DGF	import/export		
CGM binary	import/export [1]		
Claris CAD 1.0		import	import
Claris CAD 2.0		import/export	import
DDES	import/export [1]		
Dimensions	import/export [1]		
Dreams	import/export		
DXF ver. 2.54	import/export		
DXF rel. 9	import/export	import	import/export
DXF rel. 10	import/export	import/export	import/export
DXF rel. 11		import	
DXF binary	import/export		
EPS	import/export		export
Gerber Plotter	import		
HPGL	import [1]		import
HyperSpace	import/export [1]		
IGES 3.0, 4.0	import/export	import/export	
Illustrator 88 EPS, 3.0 EPS	import/export		
Illustrator 1.1 EPS	import/export		import/export
MacArchitrion text	import		
MacConcept	import/export [1]		
MacDraft 2.0	import/export		
MacDraw	import/export	import	import
MacDraw II	import/export	import/export	
MiniCAD, MiniCAD 3D	import/export		
MiniCAD+ text	import/export		
MSC/pal	export		
PICT	import/export	import/export	import/export
PowerDraw			import/export
Sculpt 3D 1.0, 2.0	import/export		
Space Edit	import		
Super 3D, Super 3D text	import/export		
Zoom binary, Zoom text	import/export		

[1] *Requires add-on module.*

While many CAD programs include translators to copy files back and forth between the CAD program and standard formats such as DXF and IGES, three companies offer separate products that provide a much wider range of options.



PowerDraw's Diverse Features This detail of a hotel and office complex, created in PowerDraw by Sprankle Sprague Architects of San Francisco, shows some of the program's many advantages. Each set of windows was created by constructing a single pair, then cloning that pair for placement up the face of the building. The highly detailed trees and finely drawn people show off drawing abilities that are as precise as those of high-end illustration packages.

plumbing, electrical wiring, and heating ducts—can work on the same project at once, each referencing the current version of the basic walls of the building. As System 7 is more widely adopted, more packages will probably offer some form of reference files—perhaps via publish and subscribe, as Deneba's Canvas and Claris's MacDraw Pro now provide.

Given the crowded field of 2-D CAD packages, I have grouped them into low-end, midrange, and high-end categories based on price. Each category discusses products in order, from worst to best.

Low-End CAD ($295 to $599)

ALL OF THE LOW-END PACKAGES EXcept VersaCAD Drafter have an interface similar to that of the original MacDraw package, which makes them relatively easy to learn.

MacDraft ($399), from Innovative Data Design, provides basic drawing tools with Mac fonts and fill patterns, but seven years after its original release, the program is still extremely limited in its snap, construction, dimensioning, and translation features. I don't recommended it.

Dreams ($599), also from Innovative Data Design, was intended as a successor to MacDraft. It was one of the first packages to provide 32-bit color support and 32-by-32-pixel fill patterns, but it lacks the snaps, dimensioning, and many of the construction features necessary to be considered a serious CAD package. Don't waste time with this one either.

MacDraw Pro ($399), from Claris, has been updated to provide such features as slide presentations, publish and subscribe, 32-bit color support, text objects with margins and tabs, and a spelling checker, all of which CAD users would find useful. But the program lacks essential CAD elements, including geometry, snaps, dimensioning, and construction features.

Despite those limitations, MacDraw Pro suits inexperienced CAD users, such as managers who want to view and mark up drawings created in other CAD packages. When combined with the optional Claris Graphics Translator ($299), MacDraw Pro can edit documents from many computer platforms. DOS PC users often pay more for such capability.

VersaCAD Drafter ($595), from Prime Computervision, is a 2-D subset of the $1995 VersaCAD/Macintosh Edition. It provides most of the geometry, snaps, construction, translation, and dimensioning features necessary for technical drawings, but with the exception of PostScript fonts, lacks illustration features.

It takes time to learn the package, and VersaCAD is relatively slow. It uses menus and tool palettes, but works more like a package that originated on another computer platform than one designed especially for Macintosh users. For instance, VersaCAD's group tool is used for selecting objects, rather than for organizing objects into hierarchies the way Mac-

	Aperture 3.0	Ashlar Vellum 2.10	AuraCAD 3.1	AutoCAD r.11	BluePrint 2.1v1	Canvas 3.04
Company	The Graphic Management Group	Ashlar	AuraSystems	Autodesk	Graphsoft	Deneba Software
Price	$795[1]	$1995	$800	$3500	$295	$399
Maximum open files	>10	>10	>10	1	4	>10
Accuracy	single-precision floating-point	double-precision floating-point	single-precision floating-point	double-precision floating-point	long integer	single-precision floating-point
Raster image support	24-bit images	32-bit images	none	none	32-bit images	32-bit images
Snaps	vertex, intersection, center, midpoint, along edge	vertex, intersection, center, along edge, percent	vertex, center	vertex, intersection, center, distance from end	vertex, intersection, center, along edge, distance from end	vertex, center, along edge
Curve drawing tools	spline	B-spline, spline	spline	B-spline, spline	Bézier[2], spline	B-spline, Bézier
Circles	diameter, radius, 3-point	diameter, radius, 3-point, tangent to 3 objects	radius, 3-point	diameter, radius, 3-point, tangent to 3 objects	diameter, radius, 3-point	diagonal box only
Coordinates	numeric display, numeric entry	numeric display, numeric entry	numeric display, numeric entry, digitizer entry	rulers, numeric display, numeric entry, digitizer entry	numeric display, numeric entry, digitizer entry	rulers, numeric display, numeric entry
Construction	parallels, tangents, normals, mirror images, arrays	parallels, tangents, normals, mirror images, arrays, fillets	parallels, tangents, normals, mirror images (flip only), arrays (linear, polar only), fillets	parallels, tangents, normals, mirror images, arrays, fillets	parallels (lines only), tangents, normals, mirror images, arrays, fillets	tangents, normals, mirror images (flip only), arrays (linear only)
Modification	trim, extend, rotate, add/subtract area	trim, extend, snip, rotate	trim, extend, rotate	trim, extend, snip, rotate	trim, extend, add/subtract area, rotate, align	add/subtract area, snip, rotate, align/distribute
Drawing enhancements	fill patterns, line weights	line weights, hatching	line weights, hatching	hatching	fill patterns, line weights, hatching	fill patterns, line weights, hatching
Dimensions	linear	linear, chain, stacked, angular, circle radius, tolerances	linear, chain, stacked, angular, tolerances	linear, chain, stacked, angular, circle radius, tolerances	linear, chain, stacked, angular, circle radius	linear, chain, stacked, angular, circle radius, tolerances
Copy and paste	yes	yes (paste not editable)	yes	yes (vectors, no fill patterns for copy)	yes	yes
Symbol libraries	yes	yes	yes	no	yes	yes
Text	Mac fonts, wrap text	Mac fonts, internal fonts	Mac fonts, internal fonts[4]	internal fonts	Mac fonts, wrap text	Mac fonts, font outlines, tabs, wrap text
Layers	edits limited to layer, edits through layers, named layers, gray layers	edits limited to layer, edits through layers, named layers	edits limited to layer, named layers	edits through layers, named layers	edits limited to layer, edits through layers, named layers, gray layers	edits limited to layer, edits through layers, named layers, gray layers
Macro language	no	no	yes	yes	no	no
Translation	DXF in/out; PICT in/out	DXF in/out; IGES in/out; PICT in (uneditable)/out; EPS out; Illustrator out	PICT in/out; DXF, IGES option ($400)	DXF in/out; IGES in/out; EPS out (user must edit file type)	DXF in/out; PICT in/out; EPS out	DXF in/out; IGES in/out; PICT in/out; EPS in/out; Illustrator in/out
Architectural and mechanical engineering features	no	door/window insertion, automatic wall mending, architectural fill patterns, bolt/screw libraries, dynamic simulation	gear macros, bolt/screw libraries; CAM software $2500–$5000 extra	architectural hatch patterns	appliance libraries	architectural hatch patterns
Database connections	no[5]	no	no	text file output	no	no

[1] *Aperture Professional, which is networkable and includes relational database features; $1495.*
[2] *A third-order curve unlike the fourth-order curves found in Adobe Illustrator and Aldus FreeHand.*
[3] *Does not always copy and paste properly between applications*
[4] *Rotates text 90 degrees only.*
[5] *Includes internal database.*

Draw-like packages do. Only one group can exist at a time.

Canvas ($399), from Deneba Software, was the first product in this realm to add support for new System 7 features such as publish and subscribe and 32-bit memory. Canvas also provides Bézier curves, 32-bit color support, color separations, and great text-handling features for slanting margins and wrapping text around objects, among other features. But it lacks geometry, snap, and construction features found in better CAD packages. Technical illustrators might find Canvas convenient for adding finishing touches to drawings created in other CAD packages, but architects and engineers will need a more substantial program.

DesignCAD ($299), from the company of the same name, is an integrated 2-D/3-D package with a complete set of snap and dimensioning functions. Dimension values update automatically when you edit an associated object. DesignCAD unifies its geometry by representing everything internally as 3-D splines (Bézier-like curves). Rectangles, circles, or any other primitive object can be changed into a free-form shape using the spline-editing tool. This unified approach makes for a sluggish program when redrawing or duplicating. And although DesignCAD claims accuracy up to 16 decimal places, its working accuracy for cumulative dimensioning tasks is only 2 decimal places—unacceptable for a CAD program. The program has other difficulties. For example, you can open only one drawing at a time, and Undo doesn't work with many tools and commands.

Generic CADD ($495), from Autodesk, provides good basic CAD capability, and for a package that originated on an MS-DOS platform it is surprisingly true to the Macintosh user interface. Unfortunately, most of the add-on modules available for the MS-DOS version of the product are not available for the Mac, and the Mac

Claris CAD 2.0v8	DesignCAD 3.01	Dreams 1.1	FlexiCAD 2.0 rev 2.22	Generic CADD 2.0	MacBravo Detailer	MacDraft 2.1	MacDraw Pro 1.5v1
Claris	DesignCAD	Innovative Data Design	Amiable Technologies	Autodesk	Schlumberger	Innovative Data Design	Claris
$899	$299	$599	$1495	$495	$1995	$399	$399
	1	4	4	>10	1	4	7
ingle-precision floating-point	long integer	long integer	double-precision floating-point	double-precision floating-point	double-precision floating-point	long integer	single-precision floating-point
-bit images	32-bit images	32-bit images	none	8-bit images	none	32-bit images	32-bit images
ertex, intersection, enter, along edge, per-ent, distance from edge	vertex, percent from end, intersection, center, along edge, grid	vertex	vertex, intersection, center, along edge, per-cent, distance from end	vertex, intersection, center, along edge, parallel	vertex, intersection, center, along edge, distance from end	vertex, center	grid
-spline, spline	spline	B-spline, Bézier, spline	B-spline, Bézier, spline	Bézier, spline	spline	B-spline, Bézier, spline	Bézier, spline
iameter, radius, -point, tangent to objects	diameter, radius	diameter, radius, 3-point	diameter, radius, 3-point, tangent to 3 objects	diameter, radius, 3-point, tangent to 3 objects	diameter, radius, 3-point, tangent to 3 objects	diameter, radius, 3-point	radius
ulers, numeric display, umeric entry	numeric display, numeric entry	rulers, numeric display, numeric entry	rulers, numeric display, numeric entry, digitizer entry	numeric display, numeric entry	rulers, numeric entry, digitizer entry	rulers, numeric display	rulers, numeric display
arallels, tangents, ormals, mirror images, rrays, fillets	parallels, perpendiculars, tangents, mirror, flip, fillets to straight lines, arrays	parallels (lines only), mirror images (flip only), fillets	parallels, tangents, normals, mirror images, arrays, fillets	tangents, normals, mirror images, arrays, fillets	parallels, tangents, normals, mirror images, arrays, fillets	mirror images (flip only)	mirror images (flip only)
rim, rotate otate, lign/distribute	trim, rotate	trim, extend, snip, add/subtract area, rotate, align/distribute	trim, extend, snip, rotate, align/distribute	trim, extend, snip, rotate	trim, extend, rotate	rotate, align/distribute	rotate, align/distribute
ill patterns, line veights, hatching	fill patterns, line weights	fill patterns, line weights	fill patterns, line weights, hatching	fill patterns, line weights, hatching	fill patterns, line weights, hatching	fill patterns, line weights	fill patterns, line weights, hatching
near, chain, stacked, ngular, circle radius, olerances	linear, chained, stacked, angular, circle radius/ diameter, tolerances	linear, chain	linear, chain, stacked, angular, circle radius, tolerances	linear, chain, stacked, angular, circle radius, tolerances	linear, chain, stacked, angular, circle radius, tolerances	linear	no
es	yes (within program)	yes	yes (text copies as lines)	yes	yes [3]	yes	yes
es	yes	no	yes	yes	yes	yes	yes
Mac fonts, internal onts, wrap text	Mac fonts, wrap text	Mac fonts, wrap text	internal fonts	Mac fonts, font outlines, wrap text	internal fonts	Mac fonts, wrap text	Mac fonts, tabs, wrap text
dits limited to layer, dits through layers, named layers	named layers, edits through layers, edits limited to layer	edits limited to layer, named layers, gray layers	edits limited to layer, edits through layers, named layers	edits limited to layer, edits through layers, named layers	edits through layers	edits limited to layer, named layers, gray layers	edits limited to layer, edits through layers, named layers
o	no	no	no	no	FIT	no	no
PICT in/out	DXF in/out; IGES in/out; PICT in/out; EPSF out; XYZ in/out; RIB out	PICT in/out; EPS out	DXF in/out; IGES in/out; PICT in/out; EPS in/out; Illustrator in/out	DXF in/out; PICT in/out; EPS out; AutoCAD in	DXF in/out; IGES in/out; EPS out	PICT in/out; EPS out	PICT in/out; EPS out
o	machine part and appliance libraries	no	door/window insertion	appliance, HVAC libraries, piping libraries architectural hatch patterns	no	no	no
es	no	no	yes	no	no	no	no

version's file translators are buggy. Still, Generic CADD makes an excellent beginner's package.

BluePrint ($295), from Graphsoft, is a relatively complete 2-D CAD package at a price that's hard to beat. It offers most of the geometry, snap, construction, dimensioning, and translation features that CAD users need. BluePrint's smart cursor automatically snaps to centers and aligns horizontally or vertically to existing vertices, speeding the drawing process.

While the package lacks high-end features such as macros and database connections required by some users, and although editing is limited to individual layers, BluePrint is a superb beginner's tool, well suited for educational settings, and would satisfy the needs of many professional users as well.

MIDRANGE CAD ($695 TO $1495)

SEVERAL MIDRANGE PRODUCTS COMPETE well with higher-priced packages for CAD functionality. The better programs demonstrate how well CAD packages can support a MacDraw-like interface without sacrificing speed and features.

AuraCAD ($800), from Aura Systems, was conceived primarily as an interface to the company's CAM (computer-aided manufacturing) software for controlling computerized machine tools. The awkward interface makes for a steep learning curve, and a variety of constraints in features sometimes make the program rigid and hard to use. For example, you must place endpoints before drawing lines, and define a group to move objects; and a group cannot contain any other groups. These problems, combined with a limited feature set, make the package clumsy for design, but machinists may want to consider it because it offers CAM extensions.

Snap, from Forthought, was designed for CAD users familiar with Intergraph—a dedicated CAD computer system favored by many serious users. The package is available in two versions, 3.17 ($695) and 3.27 ($1495), both of which support reference files. The high-end version adds

	MicroStation Mac 3.6	MiniCAD+ 4.0	Pegasys II 3.3	PowerDraw 3.0a	Snap 3.17	VersaCAD[6] Drafter 4.0
Company	Intergraph	Graphsoft	IGC Technology	Engineered Software	Forthought	Computervision
Price	$3300	$795	$1795	$795	$695[7]	$595
Maximum open files	1	4	1	>10	1	1
Accuracy	long integer	long integer	single-precision floating-point	single-precision floating-point	long integer	double-precision floating-point
Raster image support	32-bit images	32-bit images	none	32-bit images	none	none
Snaps	vertex, intersection, center, percent, distance from end	vertex, intersection, center, along edge, distance from end	vertex, intersection, center	vertex, intersection, center, along edge, percent	vertex, center, percent	vertex, intersection, center, along edge
Curve drawing tools	B-spline, spline	Bézier[8], spline	spline	B-spline, Bézier	spline	Bézier, spline
Circles	diameter, radius, 3-point, tangent to 3 objects	diameter, radius, 3-point	diameter, radius	diameter, radius, 3-point, tangent to 3 objects	radius	diameter, radius
Coordinates	numeric display, numeric entry, digitizer entry	numeric display, numeric entry, digitizer entry	numeric display, numeric entry, digitizer entry	rulers, numeric display, numeric entry	numeric display, numeric entry, digitizer entry	numeric display, numeric entry, digitizer entry
Construction	parallels, tangents, normals, mirror images, arrays, fillets	parallels, tangents, normals, mirror images, arrays, fillets	parallels, tangents, normals, mirror images, arrays, fillets	parallels, tangents, normals, mirror images, arrays, fillets	parallels, tangents, mirror images, arrays, fillets	parallels, tangents, normals, mirror images, arrays, fillets
Modification	trim, extend, snip, rotate	trim, extend, add/subtract area, rotate, align	trim, extend, snip, rotate, align/distribute	trim, extend, add/subtract area, rotate, align/distribute	trim, extend, snip, rotate	trim, extend, snip, rotate
Drawing enhancements	line weights, hatching	fill patterns, line weights, hatching	fill patterns, line weights, hatching	fill patterns, line weights, hatching	line weights, hatching	line weights, hatching
Dimensions	linear, chain, stacked, angular, circle radius, tolerances	linear, chain, stacked, angular, circle radius	linear, chain, stacked	linear, chain, stacked angular, circle radius, tolerances	linear, chain, stacked	linear, chain, stacked, angular, circle radius, tolerances
Copy and paste	yes	yes	no	yes	yes (text only)	yes
Symbol libraries	yes	yes	yes	yes	yes	yes
Text	Mac fonts, internal fonts, wrap text (manually)	Mac fonts, wrap text	Mac fonts, internal fonts, tabs, wrap text (manually)	Mac fonts, internal fonts (plotting only), wrap text	Mac fonts, internal fonts, wrap text	Mac fonts (printed only), internal fonts
Layers	edits through layers, edits limited to layer	edits limited to layer, edits through layers, named layers, gray layers	edits limited to layer	edits limited to layer, named layers, gray layers	edits through layers	edits limited to layer, edits through layers, named layers
Macro language	yes	yes	no	yes	no	optional tool kit ($25)
Translation	DXF in/out; PICT in/out; IGES in/out	DXF in/out; PICT in/out; EPS out	DXF in/out; PICT in/out	PICT in/out	DXF, IGES option; PICT in/out; EPS out	DXF in/out; IGES in/out; PICT in; EPS out
Architectural and mechanical engineering features	architectural fill patterns	appliance libraries	architectural fill patterns	door & window insertion, architectural fill patterns, appliance libraries, gear macros	no	[6]
Database connections	to Oracle database	spreadsheet entity	text file output	text file output	3.27 version only	[6]

[6] VersaCAD/Macintosh Edition $1995 offers door and window insertions and database connections. [7] Ver. 3.27, $1495, includes support for facilities management, bills of materials, and other database activities. [8] A third-order curve unlike the fourth-order curves found in Adobe Illustrator and Aldus FreeHand.

features for facilities management, bills of materials, and other database activities. With optional translators ($195 each), Intergraph and DXF files can be opened and edited.

Those who haven't worked with Intergraph will need substantial training to learn various two-letter keyboard commands to access features that are not included in the tool palettes or menus. And since Snap provides only a subset of Intergraph's features, it's likely to disappoint experienced users.

Aperture ($795), from the Graphic Management Group, is a programmable graphical database designed for facility management. Its integrated 2-D drawing package is capable, featuring a snap collection and the ability to turn objects into HyperCard buttons. Clicking on one of those button pops up a user-defined view of any drawing.

Although Aperture offers keyboard shortcuts for most snaps, the tangent and perpendicular constraints force you to wade through a hierarchy of dialog boxes. Aperture also hides the trim and other editing settings in a menu that changes according to the selected tool. Those menu choices are really modifiers that belong in the tool palette, where you could tell at a glance if your drawing tool is set to trim, edit, or draw. It also lacks filleting and double-line tools (which are handy for drawing walls).

FlexiCAD ($1495), from Amiable Technologies, is a tough package to learn, but those who make the effort find some rewards. FlexiCAD provides relatively complete geometry, snap, construction, translation, and dimensioning tools; and Amiable offers a sign-cutting version. FlexiCAD lacks features that illustrators would desire, however, and exces[illegible] of complex dialog boxes slows th[illegible] ing process.

FlexiCAD presents one other frustration. Amiable Technologies copy-protects the software by using the EvE ADB device, a hardware key connected in-line with the keyboard or mouse. I find this device obnoxious, because having more than two keys attached at once makes the keyboard and mouse less reliable, and because you must shut down the Mac to add or remove the EvE. In workgroups where users share computers with cartridge-based hard drives, or where users take disk drives home to work on, users must remember to keep the hardware key with the disk on which the software is loaded. Occasionally the key breaks and must be replaced, making it impossible to run the software in the meantime.

Claris CAD ($899), from Claris, adds geometry, snaps, construction, and dimensioning features to MacDraw II, to [illegible]duce a serious CAD package with ba[illegible]es. But after a long period with-

out an upgrade, Claris CAD has fallen behind the competition.

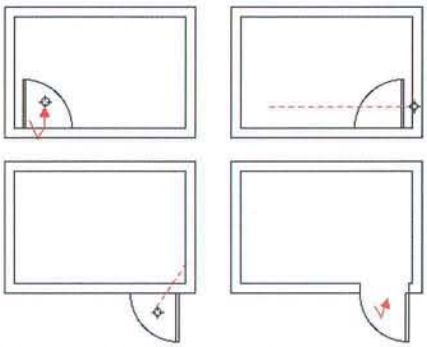
Claris provides database connections for ClarisCAD, and at one time indicated plans to expand these connections into strong enough links to its database program, FileMaker, to offer a low-end Geographic Information System—a type of mapping software similar to CAD that produces maps from queries to databases of demographic information. That project was never completed, but CAD users able to write code might readily find ways to access those database connections anyway. It won't be simple, however, since Claris CAD lacks provisions for macros.

Still, Claris CAD is one of the fastest products on the market for scrolling and zooming—an important advantage when working on large, complex drawings.

MiniCAD+ ($795), from Graphsoft, is a fast and accurate 2-D/3-D package. Those who are familiar with MacDraw will find MiniCAD+ easy to use, although its extensive feature set takes some time to learn. The spreadsheet, a particularly strong feature, makes it easy to count items such as doors and windows. MiniCAD+ has a clever feature for entering into a group for editing, then exiting back out without having to reselect the individual objects that composed the group. This program also provides a MiniPascal programming language, making it possible for sophisticated users to design special-purpose tools. MiniCAD+ also has a smart cursor for showing the alignment of different objects on the fly.

In the latest MiniCAD+ update, the division of functions between menus and the tool palette makes more sense. And curves can now begin as Béziers, where the curve's tangents control its shape, and end as splines, where the curve's control points determine the shape. The biggest addition, however, is a multipurpose wall tool that controls a wall's appearance and geometry. The tool automatically adds user-defined cavity lines and fills for representing construction information. Segmented walls automatically close with the proper corner joint when the wall ends where it began. MiniCAD+ automatically cuts walls at window or door symbol locations, and the cut follows the symbol when it's moved.

PowerDraw ($795), from Engineered Software, is one of the best-kept secrets in the industry. The company paid close attention to the interface, and is so dedicated to elegance and speed that it has almost completely rewritten each new version of the package. Although anyone familiar with programs that build on the MacDraw interface will immediately feel comfortable working in PowerDraw, users should consult the manual to take full advantage of the software's power.



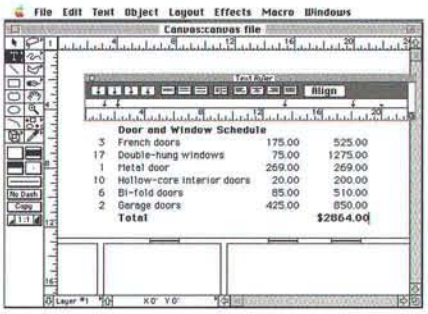
Easy Doors and Windows PowerDraw's next version will place door- and window-insertion tools on an architectural palette. To insert a door, just click on one side of the wall and let go on the other. Setting the door's direction and trimming the walls, a task that used to take a minute or so, is now handled with the next click of the mouse.

PowerDraw provides one of the most extensive lists of 2-D drawing and construction features available, even when compared with high-end CAD packages, and it has a macro language. PowerDraw's principal failing is its lack of reference files. Artists and designers will want to keep Illustator or FreeHand for occasions when they need to wrap text around curves, but they will appreciate PowerDraw's speed in editing complex files.

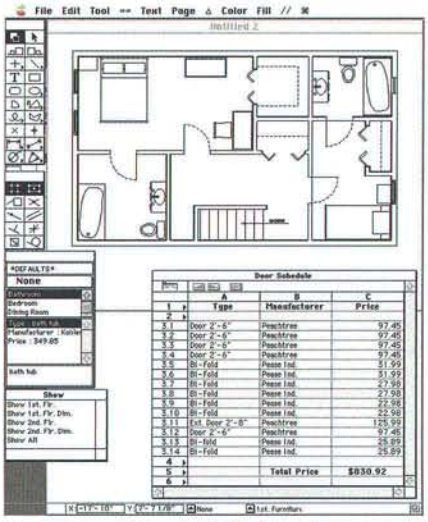
HIGH-END CAD ($1795 TO $3500)

MacBravo Detailer ($1995), from Schlumberger, is the 2-D foundation for the company's specialized 3-D programs. Early versions of MacBravo's reveal its beginnings in the workstation market, but the latest version has scroll bars, multiple color palettes, tear-off menus, copy and paste between applications, and object translation by mouse dragging. Still, maddening workstation-style holdovers slow you down; moving a line endpoint or drawing a box requires cumbersome work in a dialog box.

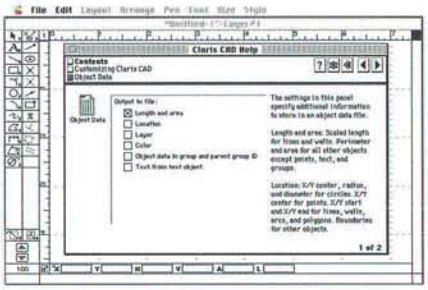
MacBravo 3.0's improved dimensioning tools give complete control over a dimension's appearance, however. And the part-attributing feature—for adding properties such as part numbers to objects—is a welcome addition. Among drafting tools, MacBravo lacks only the double-line and elliptical-arc tools. The program has a spline tool, but it supports control of terminal slopes only. MacBravo falls down in its symbol work—it lacks thumbnail libraries essential for finding the correct symbol easily. And because the program places symbols as instances rather than copies, all symbol uses change when you change the master drawing. MacBravo limits networking (beyond System 7 capabilities) to DEC VAX machines—a major weakness compared with other high-end programs.



Convenient Rulers Packages such as Canvas provide text rulers with tabs. Tabs and indents will appear in other CAD packages soon, making it easier for users to set up paragraphs and data tables.



Super Spreadsheet MiniCAD+ allows easy collection and manipulation of data. The spreadsheet can be placed directly on the drawing, complete with gridlines. MiniCAD+ provides formulas for automatically counting symbols placed on the drawing.



Help Has Arrived Claris CAD provides a HyperCard-like help system, complete with a table of contents, index, and cross-references. The above card describes how to set the preferences file to collect database information.

Ashlar Vellum ($1995). Ashlar originated the concept of the inference engine, a technique that has been copied by several other companies for snapping to points in alignment with existing reference points. The inference engine works

well for mechanical parts but is less suited to designs that are not based on rectangles, such as suburban subdivision plots.

Vellum also provides parametrics, a technique for editing geometry by altering the numerical values of associated dimensions. After drawing a triangle, for instance, a user can specify the length of each side, and the triangle reshapes itself to match. But Vellum's parametrics are difficult to implement on all but the simplest geometry, and no provision is made for importing dimensions from standard parts lists. Vellum also includes a "Movies" feature that analyzes a mechanism, then records, animates, and plays back its motion. The program also allows the user to reference various parts of a document to make simultaneous changes, but it doesn't support reference files across a network or between drawing files.

These fancy features have been implemented at the expense of more basic functionality. For instance, Vellum users can view but not manipulate objects pasted in from other packages.

Pegasys II ($1795). IGC Technology designed Pegasys for use in the company's own service bureau. For a package that ignores Macintosh interface standards, it is surprisingly easy to learn and use, but Pegasys II provides no features that set it apart from less expensive programs.

AutoCAD ($3500). Autodesk began shipping Release 11 for the Mac in May, a year after it shipped the DOS version, and the company started shipping Release 12 for DOS in June. While it was not possible to open a Release 11 file in Release 10, Autodesk says that Mac Release 11 and DOS Release 12 have the same file format. Therefore, Macintosh users won't continue to be left out in the cold when it comes to sharing AutoCAD files with people working on other platforms.

AutoCAD now has pull-down menus, resizing handles, and tool palettes; but it is still basically a command-line–driven package that runs very slowly on all Macs. Where Release 10 could only copy graphics to the Scrapbook, Release 11 can paste vector graphics from the Scrapbook, as long as neither fill patterns nor raster objects are included. The program provides most of the geometry, snaps, construction, and dimensioning features offered in other CAD packages, plus reference files.

But it lacks features such as fill patterns, unproportional scaling, Mac fonts, and text wrap. Many of the third-party extensions for which AutoCAD is famous are unavailable on the Mac. And AutoCAD users must distinguish layers by color to avoid selecting objects from the wrong layer. That's an antiquated and inefficient approach.

Hatching Plots

There was a time when CAD users had to buy a plotter to obtain a hard copy of their drawings because the dot matrix and daisy wheel printers of the time couldn't handle CAD graphics. Today many users prefer to print on 11-by-17-inch laser printers to reduce the time spent from hours to minutes, and to reduce the expense for plotter supplies. But there are still a few die-hards who prefer the D- and E-size output from a plotter.

Three companies provide plotting software that can be used with a variety of Mac software, including CAD and illustration packages. Several CAD products include a subset of one of these packages.

Microspot's MacPlot is a set of Chooser drivers for various types and sizes of plotters, with prices ranging from $199 to $2495. MacPlot is capable of plotting solid and outline PostScript and TrueType fonts, can work in the background, and provides for network plot sharing. Fill patterns can be plotted dot by dot or by assigning a crosshatch to each fill pattern. (The versions included with particular CAD software packages may not provide all of these capabilities.)

Plottergeist ($495), from Palomar Software, is a set of Chooser drivers that supports a wide variety of plotters. It handles solid and outline PostScript and TrueType fonts and provides background spooling.

Engineered Software's MacPlots II ($250) is an application that opens PICT files and allows users to specify which color pen should draw each of the elements in the drawing. The package does a fairly good job of handling bitmapped images created in packages such as MacPaint or Photoshop. MacPlots II can convert text to stroked fonts or plot them as bitmapped images—but the program is not suitable for plotting font outlines unless the originating package can convert fonts into curves. MacPlots II can also convert fill patterns into hatch patterns.

Although Autodesk recently added a support telephone line, users are expected to obtain primary support from their authorized dealer—always a gamble. For this much money, you should go for a faster package that implements the Macintosh interface more competely and provides direct support.

MicroStation Mac ($3300). Like Autodesk, Intergraph has been slow to update the Macintosh version of MicroStation to match versions on other platforms. Intergraph decided to solve the problem by standardizing all computer platforms on the Unix Motif user interface, starting with version 4. The Macintosh version 4 should be available by the time you read this, about a year after version 4's introduction on PC compatibles.

MicroStation's interface is based on Intergraph's key-in command set, but most of the commands can be selected from menus or tool palettes. The icons minimize the need for memorization but do little to speed overall learning, since the user must become familiar with hundreds of icons.

MicroStation's implementation of reference files clearly puts the package a step ahead of its competition for huge projects that demand networks of designers. The package also provides connections to the Oracle database program. However, MicroStation is weak on illustration and, like FlexiCAD, uses the annoying EvE ADB hardware key.

MW EDITORS' CHOICE

Low End 2-D CAD

BluePrint For basic CAD features, plus a convenient "smart cursor," this product is a bargain. **Company:** Graphsoft. **List price:** $295.

Midrange 2-D CAD

PowerDraw The overall best and fastest set of 2-D CAD and illustration tools on the market compensate for this program's inability to operate over a network. **Company:** Engineered Software. **List price:** $795.

High End 2-D CAD

No Selection Few users will find these programs to be more effective than our midrange pick.

The deficiencies among all the high-end programs make it clear that in an area like CAD, where complex programs boast hundreds of features, pricing can be arbitrary. If you're like most CAD users, you'll be satisfied with a cheaper program—and you won't have to sacrifice speed or quality in the process. **m**

See *Where to Buy* for contact information.

ANN MEYER is a CAD consultant based in Las Cruces, New Mexico.

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Reviews

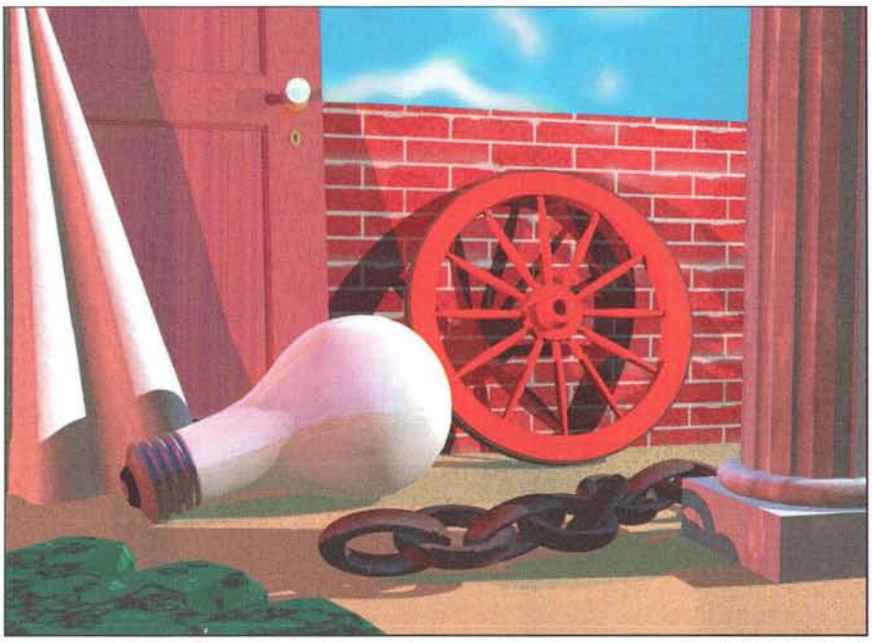
IN THIS ISSUE: Microsoft Project, FileMaker Pro, Adobe Premiere 2.0, Managing Your Money, Hello, PLI MiniArray, Voice Navigator SW, WonderPrint, FlowChart Express, and more

3-D Visualizing Software

Infini-D 2.0

PROS: Excellent procedural textures, rendering, and animation tools. **CONS:** 3-D modeling component lacks splines; no wire-frame vertex editing. **COMPANY:** Specular International (413/549-7600). **REQUIRES:** Mac II with math coprocessor; 4MB of RAM; hard drive; 8-bit video board; System 6.0.7. **LIST PRICE:** $995.

MW ★★★★



SCOTT BALDWIN

Ray Trace Image Infini-D can produce excellent ray tracings. The outlines for the lightbulb and column were drawn in FreeHand 3.1. The drapery and gear on the left were imported from Ray Dream Designer. The chain was imported from Swivel 3-D. All other objects (door, brick wall, and wagon wheel) were done in Infini-D. The scene uses three light sources.

COMBINING 3-D MODELING, IMAGE rendering, and animation, visualization programs address the design cycle from conception to presentation. Infini-D 2.0 offers an excellent collection of visualization tools at a relatively affordable price. The software is easy to use and competent enough to serve in many professional applications. However, Infini-D's strongest elements are its rendering and animation capabilities.

Version 2.0 adds the ability to directly import encapsulated PostScript (EPS) and Drawing Exchange File (DXF, the CAD standard) files; to save animations in QuickTime form; and to map QuickTime movies on 3-D objects. Infini-D 2.0 also supports 32-bit QuickDraw's alpha channel. The alpha channel allows you to composite (seamlessly superimpose) Infini-D models into photos using image processors, or overlay models on videotape. Improvements in the program's rendering capabilities include better antialiasing, the ability to display shadows in Phong shadings, simulated halogen lights, colored fog effects, and faster speeds in all modes.

Infini-D models inhabit a 3-D world defined by x, y, and z coordinates. (Infini-D uses y to signify depth and z to denote height—it's not the first program to do this, but the process is still nonintuitive.) You look into this world through six standard views—top, bottom, front, back, left, and right—plus any number of camera views. Cameras mimic photographic lenses from fish-eye to telephoto, letting you examine models from any perspective. Infini-D cameras are objects that you can move anywhere in the program's 3-D world.

At the heart of Infini-D's modeler are its Lathe, Extrusion, and Freeform Workshops, where you manipulate points and lines using simple drawing tools. Depending on the Workshop, objects are lathed around an axis; extruded into the third dimension; or formed by the interpolation of the object's top, front, and side outlines. You can produce some fairly sophisticated objects in any of Infini-D's Workshops, but understanding the interaction of the various outlines in the Freeform Workshop takes some practice.

Infini-D also offers five object primitives—a cone, a sphere, a cube, a cylinder, a square—that can be stretched and squashed but not otherwise edited. Similarly, the terrain tool can produce beautiful mountains or cliffs, especially when used with Mandelbrot (fractal) effects, but terrain objects can't be reshaped. Infini-D can extrude TrueType fonts into 3-D objects; if you have PostScript fonts you must first use a third-party utility to convert them to TrueType.

As with most 3-D design programs, constructing models is an exercise in building and joining subassemblies. The

Object Floater lets you enter numerical values for the positioning, orienting, and dimensioning of objects; the resulting values can be locked to prevent accidental movement, and to make animation precise. Lacking advanced object-editing capabilities, such as splines and vertex editing (manipulating individual object points), Infini-D is not the best choice for designs that require organic shapes and free-flowing curves.

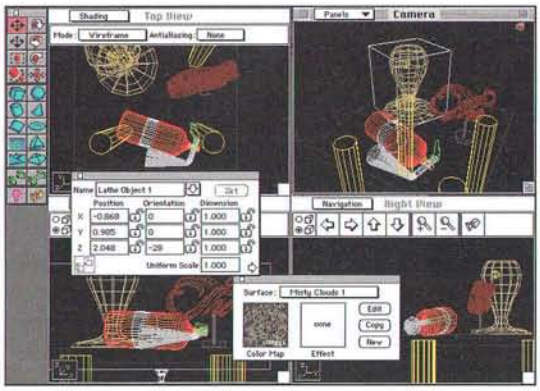
Version 2.0's ability to import DXF and EPS files (in addition to Macromedia's Swivel 3D Professional files) allows you to import complex models from Autodesk's AutoCAD, for example. (Note: DXF files come in different dialects; some may not be directly transferable.) DXF models are also imported as individual objects, so it can be difficult to scale and position them, but you can apply textures to individual objects. Infini-D can link objects and establish object-tree relationships but doesn't let you quickly group multiple objects.

With version 2.0, you can transfer EPS outlines from Aldus FreeHand or Adobe Illustrator directly into Infini-D Workshops. In fact, under System 7, Infini-D can subscribe to these programs, effectively adding their more-extensive drawing capabilities to your desktop. Alter a two-dimensional outline in FreeHand 3.1, and the change automatically appears in the subscribing three-dimensional object in the Workshop.

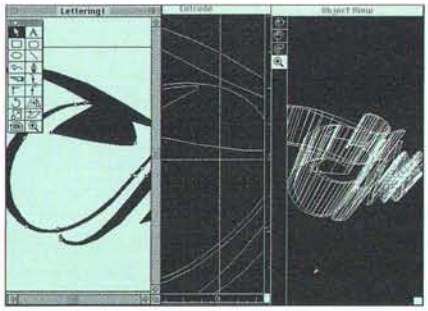
Infini-D really shines at rendering. Bucking the MacRenderMan trend, Infini-D offers an integrated approach whereby you can add light sources easily and you can choose from a large assortment of procedural textures, and Infini-D relies on its own rendering engine.

Unlike simple surface maps, procedural textures become an integral part of a three-dimensional object—like the veins in a marble slab. Texture attributes, such as surface properties (reflectiveness, specular highlights, transparency, and so on), special effects (bump, wave, and corrosion maps), and color effects (tiling, marbling, noise, and so on), are completely editable. Infini-D lets you layer textures, as well as combine them with PICT images. And version 2.0 enables you to use QuickTime movies or PICS files to produce animated surfaces. So, for example, you could model and render a television set, and then place a QuickTime movie on the surface of the TV screen.

Infini-D's rendering engine supports flat, Gouraud, and Phong shading, and three levels of antialiasing (you can do these in all views). Naturally, when shading and antialiasing quality rises, so does



World Screen Infini-D offers multiple views into its 3-D world. The object floater lets you precisely define objects, and the surface floater gives quick access to textures.



PubSub Under System 7, changes to a text outline in FreeHand 3.1 can be published directly to Infini-D's Workshop for extrusion into a 3-D object.

rendering time. Flat shading is fast but lacks detail. Phong shading with high antialiasing produces excellent renderings with shadows and textures. Using environment mapping with Phong shading lets you add fog and reflection effects that are particularly attractive with Phong shading, giving you the look of ray tracing in a fraction of the time.

Infini-D's ray-tracing option produces exquisite renderings and—a particularly nice touch—lets you preview any selection. Ray tracing can operate in the background—an important option because complex scenes can take hours (or days) to complete, even with version 2.0's faster rendering. Nevertheless, as with most programs, it's best to set your rendering to run overnight, because background rendering slows down foreground operations.

Using a time-based, key-frame approach, Infini-D also excels at animation. You can animate any object, including lights and cameras, simply by moving them in the scene and taking snapshots of their positions; Infini-D generates the intervening positions or frames. Object activity is controlled with the sequencer, a logically conceived floater that tracks the condition of every object at any moment in time. Using the sequencer timebar, it's easy to choreograph object movement and trigger events. A SMPTE time display allows cinematic precision. Infini-D even lets you metamorphose between objects that have different numbers of vertices—great for creating *Terminator*-like effects.

The manual and tutorial cover the basics but fail to scratch beneath the surface. Infini-D works well and is generally stable, but it is not without flaws. For example, high-antialiasing Phong shading of complex scenes (such as fractal terrains) in the Camera view can sometimes freeze the Mac (the company is aware of the problem). Save often—good advice with any program.

Minimum system requirements should be considered exactly that—minimum. I tested Infini-D on a Macintosh IIfx with 16MB of RAM and a SuperMac Technology Spectrum/8 24 PDQ video accelerator board. Even so, when building complex models I used only bounding-box rendering for speed. To fully exploit Infini-D, go for as much power as you can afford.

Infini-D may not be the best modeler, renderer, or animator compared with specialized products, but it offers a rich combination of capabilities and is reasonably affordable. Infini-D may well be the best all-around 3-D visualization package available.—CARLOS DOMINGO MARTINEZ

Project-Management Software

Microsoft Project 3.0

PROS: New scheduling and formatting features; customizable tool bar; stronger resource scheduling and analysis. **CONS:** Can have only 20 linked or open projects; advanced functions still hard to use. **COMPANY:** Microsoft Corporation (206/882-8080). **REQUIRES:** Mac Plus; 2MB of RAM (2.5MB for System 7); hard drive; System 6.0.4. **LIST PRICE:** $695.

MW ★★★★

PROJECT-MANAGEMENT SOFTWARE IS often perceived as difficult to learn and esoteric. With Project 1.1, Microsoft removed a lot of the mystery of unfamiliar terms and nongraphic interfaces, thus attracting users who had never touched project-management software before.

Keeping with that tradition, Project 3.0's improved tool bar helps novices schedule tasks and format reports with

continues

push-button ease. Professional planners have not been forgotten, however; Microsoft has improved capacity and eliminated many scheduling glitches. Microsoft Project can tackle many jobs that were previously reserved for high-end programs, yet it is simple enough to turn out a presentation-quality Gantt time line in just a few minutes.

Ease-of-Use Focus

PROJECT'S TOOL BAR, LIKE THAT OF Microsoft Word and Excel, automates about 80 percent of common tasks. For example, there are buttons to link tasks in sequence; assign resources to jobs; and perform scheduling duties, such as marking tasks complete.

If you know other Microsoft applications, you'll be pleased with Project's consistent interface. You can add, remove, or customize tool-bar buttons—or double-click on the boundary of a column to automatically set optimum column width—the same as in Excel.

In fact, Microsoft Project 3.0 offers numerous "hot spots" that make it easier to view, enter, or modify project information. Double-click on a column heading in the spreadsheet view, say, to create a custom title or change the data field displayed. Or click on a subproject task, and the subproject file automatically opens for fast changes.

You don't need a formal project-management background to use much of Project 3.0 successfully. Start off with the simple outliner, which now offers ten indent levels. Tool-bar icons move tasks to different levels and schedule a range of tasks in sequence. The link button even connects tasks spread throughout an outline.

When inserting, deleting, or moving tasks, Project 3.0 maintains the right link, which wasn't the case with version 1.1. And now there's true work-breakdown structure (WBS), a necessity for organizing large projects or sorting tasks into related groups.

Improved Look

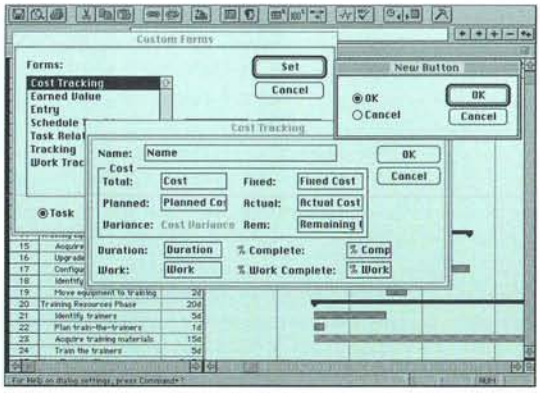
PROJECT 3.0 OFFERS MULTIPLE views that can be customized and added to the menu bar for later recall. You simply pick the most comfortable way to enter and edit project data, from among the outline, PERT network, task and resource tables, charts, and various data entry forms.

As before, only two windows can appear simultaneously, though individual views show improvement. The outliner, for instance, holds up to 102 data fields, plus the Gantt chart; version 3.0 includes 10 custom text fields and 5 note columns. Besides tracking dates, resources, and budgets, you use these fields to flag important milestones. Then, if you collapse an outline heading, the summary Gantt bar displays multiple milestones. The process is a bit inconvenient, but still useful when producing charts. The palette command changes the color or shading of Gantt bars and gives great control over charting styles.

As in version 1.1, you use the mouse to reposition or extend task bars on the Gantt display, rather than entering dates or other status figures using tables. Microsoft has eliminated some annoyances such as misleading elapsed time that appeared between tasks—and the scrolling limit of the Gantt chart is now linked to the project's length. New resource views let you graphically compare the work of individuals to the whole group, chart resource availability, and see how resource costs accumulate over time. It's also easier to pinpoint where resources are overscheduled using the Go to Next Overallocation tool-bar button.

Beyond the ability to personalize views, you can also create custom filters, such as which resources are working on specific tasks, or which tasks are running late or over budget. Building this logic involves nothing more than selecting the desired conditions from a pull-down list. At the other extreme, Microsoft Project ships with an Easy View with short menus, no project-management terms, and simple filters.

Microsoft Project's new monthly calendar report shows the work schedules of individuals, groups, or projects using bars that span appropriate dates. You can also preview up to 28 pages on a standard 13-inch monitor—a nice feature, since Gantt and PERT charts often span many pages and can break at inappropriate spots. Additionally, Project 3.0 can reduce Gantt charts to print on one page (with a PostScript printer).



Custom Forms Microsoft Project 3.0's custom forms, which can be run from a tool-bar icon, let you make advanced parts of the program inaccessible to novice users.

Greater Performance

VERSION 3.0 INCLUDES SOME IMPORTANT changes that make it appropriate for industrial-strength planning. First, you can track up to 9999 tasks per project and assign 100 resources per job. The program allows 20 open projects. Also, only 20 projects can share a common pool of labor or equipment; once you reach that limit, disconnecting existing projects from the resource pool is confusing. On the positive side, more information is gathered from subprojects, such as the percent complete.

Improved resource-management features let you delay when someone starts working on a task or assign resources to a task more than once. Project 3.0 lets you set ten priority levels for resource leveling or set a priority level only on open projects. The program also calculates schedules using shorter time periods, yielding more-efficient plans.

Project 3.0 includes comprehensive Dynamic Data Exchange (DDE) plus publish and subscribe support. DDE lets you link project data to an Excel spreadsheet. Furthermore, Project's dialog-box editor makes it easy to build special-purpose forms. Couple these forms with a macro—all run from a custom tool-bar button—and you get an easy-to-use front end to a corporate project manager such as Welcom Software's Open Plan. One problem with DDE is that it's also used to link projects, which can result in invalid logic (Microsoft says this is intentional).

Project does not include Planning Wizards (dialog-box prompts that take you through a procedure, available with Project for Windows and Excel for the Mac), but does include balloon help and a spelling checker. And Mac and Windows Project files are compatible.

I was disappointed that Project's error handling isn't bulletproof; situations where resources are scheduled outside a designated range and where tasks are allowed to start before a project begins might cause problems.

All in all, Project 3.0 is easier to use than MicroPlan Planning International's MicroPlanner Manager and has more reporting and formatting options than Scitor's Project Scheduler 5, though I'd still pick PS5 for heavy-duty midrange planning. Microsoft has done a commendable job packing an amazing range of features while keeping the program generally easy to use. Even with the release of Claris's MacProject Pro, Project 3.0 clearly will draw a majority of project-management users.—MIKE HECK

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Flat-File Database

FileMaker Pro 2.0

PROS: Improved scripting, mailing labels, and text handling; support for QuickTime and Apple events. **CONS:** Minor printing bugs; some reported problems with converting older files. **COMPANY:** Claris Corporation (408/727-8227). **REQUIRES:** Mac Plus; hard drive; System 6.0. **LIST PRICE:** $399.

MW ★★★★

FILEMAKER PRO 2.0 IS A SUBSTANTIAL upgrade to the best-selling database program, but the changes are mostly hidden and long overdue. FileMaker is still a solid, multiuser flat-file database that is easy to use.

FileMaker Pro 2.0 brings improvements in several areas. A picture field can now import a QuickTime movie. And FileMaker Pro no longer keeps multiple copies of identical items if they are included in more than one record; it saves just one copy of each graphic, sound, or movie in an internal library. Improvements also include a new pop-up list of more than 50 Avery label types, or (as always) you can make your own custom label layout.

FileMaker Pro's text-handling capabilities have improved in several ways. You can now add scroll bars to text, date, or numeric fields, and use the arrow keys to navigate text fields. You can perform wild-card searches, and at long last, you can search for punctuation marks in fields, which makes it easier to clean up imported data. There's still no search and replace feature that would enable you to step through occurrences of a found text string and replace them individually; the Replace command changes the entire contents of a field.

The 2.0 version finally adds an uppercase text style for formatting text fields such as state abbreviations. The new Title Case style capitalizes the first letter of each word in a field. And you can now select and copy data in read-only fields like Calculation and Summary; previously, this operation required elaborate workarounds.

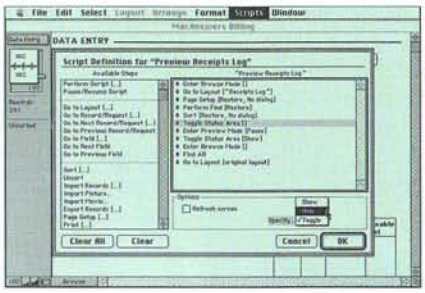
Value lists, which hold expected values of data as check boxes or radio buttons, or on a pop-up menu, can have an Other choice now, and you can tab into a value list and use the arrow keys to select one of the choices. In FileMaker Pro 1.0, you were forced to use the mouse for check boxes and radio buttons.

Claris has vastly improved FileMaker Pro's scripting feature. The new ScriptMaker command enables you to build complex scripts by double-clicking on commands from a scrolling list. Virtually all of the program's commands are included in the list, so you have a great deal of control over the program's actions within a script. You can edit, duplicate, and reorder the commands, and you can have scripts pause for user input.

You can also send System 7's Apple events via a script, so that scripts can trigger actions in other Apple event–aware applications. Using Apple events, for example, you could transfer FileMaker data to a spreadsheet program like Microsoft Excel or Claris Resolve and have those programs chart the data. FileMaker Pro 2.0 supports the Required, Core, and Database suites of Apple events, and can both send and receive Apple events. You can also send and receive Apple events from macro and system-level scripting programs such as CE Software's QuicKeys[2] and UserLand's Frontier. (Dealing with Apple events in FileMaker Pro on anything other than a rudimentary level is fairly complex, and is intended for use mainly by template developers.)

While ScriptMaker is a big stride forward for FileMaker, I'd like to see even more improvements. It would be useful to be able to embed calculations in scripts; variables to store data would also be a welcome addition. Conditionals, such as IF-THEN statements, would allow much more powerful scripts. In short, I'd like to see Claris turn ScriptMaker into a true scripting language, while maintaining its ease-of-use.

FileMaker Pro's biggest change, however, is one that does not directly affect most Macintosh users. According to Claris, version 2.0 shares file formats with Claris's new version of FileMaker Pro for Microsoft Windows, and allows Mac and Windows users to share databases over a network. If this works as planned, multiuser operations will enable Mac clients to access FileMaker Pro databases on Windows machines and vice versa. According to Claris, users will be able to transfer database files over the network, and the respective platform's applications will open the files directly, with no conversion required. Claris warns that care will need to be taken when designing databases meant for use on both platforms, because of differences between the Mac's and Windows' handling of fonts, graphics, file naming, and screen colors. The Windows version was not yet shipping at press time, so I did not test cross-platform compatibility. Potentially, sharing databases across platforms could be a big winner for Claris, even though the flat-file database market is crowded on the Windows side. Other winners could be Mac FileMaker Pro template designers looking to expand their sales horizons.



Building a Script FileMaker Pro 2.0's ScriptMaker gives you access to almost all of the program's commands in the scrolling box on the left. Double-clicking on a command transfers it into the script window to the right. Individual script commands can have optional parameters, as shown here.

Some longtime FileMaker annoyances have yet to be addressed. You still can't format data during entry as telephone or social security numbers. You can format data with calculated fields after entry, but this requires needless complexity. And, as with most new versions, users have reported some bugs. One of the most important is that some files do not convert properly from FileMaker Pro 1.0 to 2.0 format. While I didn't encounter any problems in my tests, there have been reports on the network services of incorrect conversion with files that contain lots of graphics. Claris recommends that you save a compressed copy of your FileMaker II and FileMaker Pro 1.0 databases before you attempt to convert them to the 2.0 format. The program prints hairlines incorrectly, varying the widths of the lines unpredictably. And changes in 2.0's method of creating its Mail Merge file format make it incompatible for mail merging with Claris's own MacWrite II, although I was able to merge with Microsoft Word 5.0.

Documentation, online help, and technical support—via telephone and on America Online and CompuServe—were up to Claris's excellent reputation. The manual has been rewritten to deal with past complaints that it didn't go into enough depth, and it generally succeeds.

With FileMaker Pro 2.0, Claris has managed to pull off the difficult task of improving and extending a program without making it harder to use. The changes to the layout tools make it easier to create mailing labels and work with text and graphics, and the addition of ScriptMaker should allow users who have previously been intimidated by scripting to use this powerful and time-saving feature. FileMaker Pro 2.0 is a worthy upgrade to an already excellent program.—TOM NEGRINO

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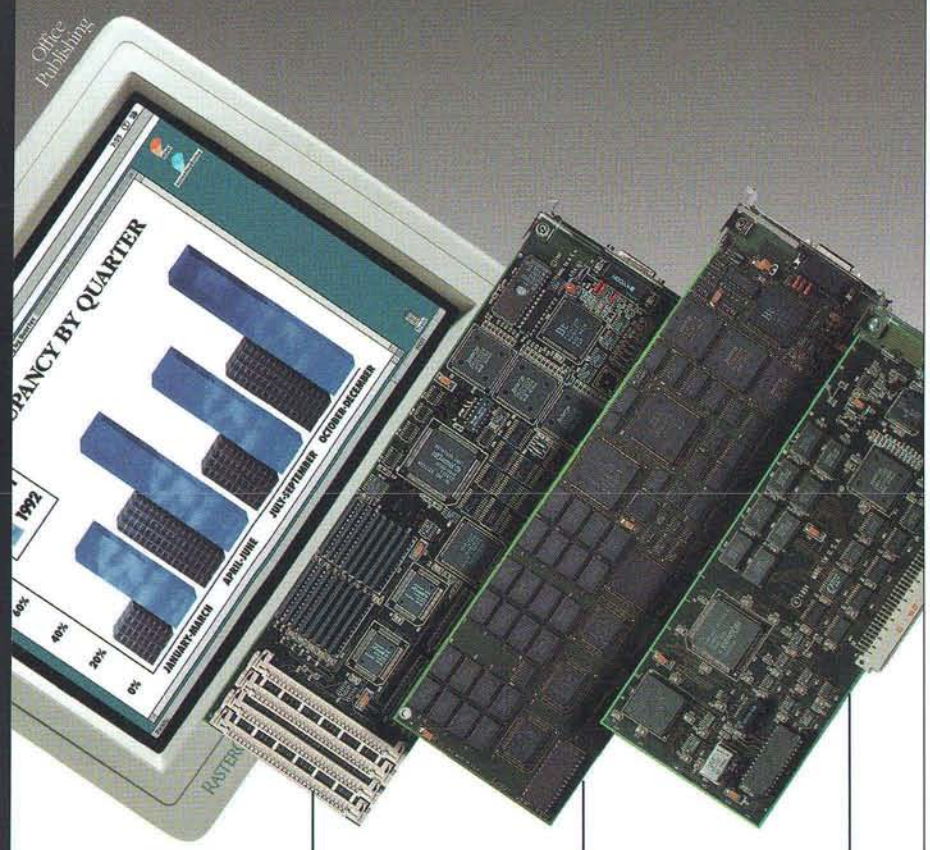

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Hard Drive–Management Utilities

Drive7 2.3

PROS: Excellent interface; can click and drag to resize partitions; balloon help; custom icon options. **CONS:** Resizing partitions erases previously stored data; documentation lacks glossary and index. **COMPANY:** Casa Blanca Works (415/461-2227). **REQUIRES:** Mac Plus; System 6.0. **LIST PRICE:** $79.95.

MW ★★★

Hard Disk Tool Kit 1.1.2 Personal Edition

PROS: Easy-to-understand interface; good testing functions. **CONS:** No custom icons for volumes; comes with a start-up disk for System 6 only. **COMPANY:** FWB Software (415/474-8055). **REQUIRES:** Mac Plus; SCSI hard drive, removable drive, or optical drive; System 6.0.5. **LIST PRICE:** $79.

MW ★★★

Silverlining 5.4

PROS: Extensive and detailed testing utilities; offers two levels of password protection; toll-free tech support. **CONS:** Complicated, lackluster interface; no online help. **COMPANY:** La Cie (800/999-3919). **REQUIRES:** Mac Plus; hard drive; System 6.0. **LIST PRICE:** $149.

MW ★★★

BEFORE YOU GO OUT AND SPEND money on a program to format, partition, and test your hard drive, remember: if your Mac came with an Apple drive originally, you already have Apple's HD SC Setup, a modest little utility that lets you reformat, partition, and test the hard drive that came with your Mac in a few simple steps.

Some tasks, however, are beyond the scope of Apple's limited utility. Suppose you've added an additional SCSI hard drive, optical drive, or removable-media drive to your system and you need to reformat or partition it. Or suppose you want to update the software that controls your hard drive and fine-tune the drive's performance for optimum speed. Or what if you want to increase the security of your data by adding password protection to your drive?

These jobs call for third-party formatters such as Casa Blanca Works' Drive7, La Cie's Silverlining, or FWB's Hard Disk Tool Kit Personal Edition—three straightforward utility programs that help demystify hard drive management and enable you to perform a wide range of tests and maintenance procedures on SCSI drives.

Drive7

DRIVE7 2.3 IS A UNIVERSAL HARD DRIVE updater and formatter with an interface that's easy enough to use to make hard drive maintenance seem almost—relaxing. The program can update Apple drives and most third-party drives, including a variety of removable-media drives. The latest version also offers sound support for NEC CD ROMs and sound and data support for Apple and Toshiba CD ROMs.

Launch Drive7 and you are presented with a blank menu bar (even the Apple menu disappears) and an attractive, uncluttered interface featuring six large three-dimensional buttons and a main message area. After selecting the drive you want to update, you click on the appropriate button to install Drive7's driver software, to format or partition the drive. Clicking on the zoom box reveals another four buttons for mounting and testing drives, customizing icons, and scanning the SCSI bus. Drive7's well-implemented balloon help is activated by clicking on the Help button right on the main panel.

Partitioning a drive to create new logical volumes is simple with Drive7. The program includes several standard partition styles from which to choose (Maximum Macintosh, two equal-size Mac volumes, Standard A/UX, and so on), or you can create a custom partition scheme. By clicking on the appropriate indicator icons, each partition can be designated read-only, set to mount automatically at start-up, or assigned a password. Best of all, the partitions—each represented as a separate rectangle in Drive7's partition size window—can be resized simply by dragging the rectangles to make them larger or smaller.

One important caution: Drive7 completely erases and reinitializes any partition that you resize, even if there's still adequate space for the data you've already placed within it. This means you need to do all your partitioning with Drive7 before any data is stored on the drive or back up your data and restore it. The other two formatters allow you to make some modifications to partitions while preserving the data within them.

Drive7 also offers great options for customizing the way volumes appear in the Finder. You can choose from more than 40 sharp-looking drive icons to represent your volumes on the desktop, with or without SCSI ID numbers superimposed on them. Unfortunately, you can't assign names to drives or volumes from within the application; that has to be done on the desktop.

Easy Going The simple Drive7 interface makes formatting and updating a hard drive easy. Clicking on the Help button activates balloon help.

The program conveniently comes with two bootable floppy disks—one with a modified System 6.0.8 and the other with a minimal System 7.0.1. (You must boot from the floppy disk to have full access to all of your connected hard drives.) Along with Drive7 itself, you get Drive7rem, a very handy control panel from which you can set partition attributes and get detailed information about the SCSI bus and your CPU. It's great to be able to lock and unlock drives and change passwords without even launching the Drive7 application.

On the downside, Drive7's testing functions are less than impressive, providing little feedback while tests are in progress. Testing with Drive7 is also slow; a full checkup on my 80MB hard drive took about 16 minutes.

A few other complaints: Unlike its competitors, Drive7 offers no keyboard commands to speed up your work. Also, the otherwise complete manual lacks an index and a glossary. And the documentation for version 2.3 was not updated to reflect changes in the program's main interface, creating some minor confusion.

Hard Disk Tool Kit

HARD DISK TOOL KIT PERSONAL EDITION is designed as an entry-level, non–power-user version of FWB's heavy-duty Hard Disk Tool Kit, which sells for about $120 more than the trimmed-down Personal Edition (PE). FWB has stripped out the more arcane features of the standard Tool Kit and left the basics. Still, everything you really need is here.

The program consists of three components. HDT Primer—the main application—is used to format, update, partition, and password-protect your drive. HDT Prober is a control panel that lets you mount and unmount SCSI devices and scan the SCSI bus for detailed information about your drives, system, and

CPU. The HDT Extension is an INIT that automatically loads device drivers for removable-media drives so that the drives will automatically mount a new cartridge when you insert one.

Primer's main functions are accessed through the Volume Selector Screen, which lists each volume, along with its SCSI ID, capacity, make, model number, and revision number. You can click on any of six icon-like buttons to format, partition, mount, unmount, get information about, or test the selected drive.

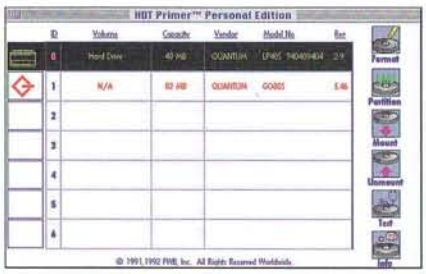
Tool Kit PE tries to make hard drive set-up as foolproof as possible. For example, it provides not two, but three frantic warning dialog boxes before letting you reformat a drive ("LAST warning! Formatting will destroy ALL data on the disk!"). The well-designed interface makes navigating the program easy, and online help can be accessed with a keyboard command.

Once you activate the Partition directory, you can set up, modify, erase, and delete partitions on your drive. Volume sizes are set by editing the number of kilobytes allocated to the volume in the Size field—more precise but less convenient than Drive7's drag-to-size approach.

When modifying partitions, Tool Kit PE lets you add password protection and designate a volume as read-only. But, unlike Drive7, Tool Kit PE doesn't allow you to assign custom icons to volumes on the desktop.

Tool Kit PE offers superior testing functions. A test-information window appears when tests are running, listing any bad sectors found during tests and showing both elapsed time and remaining time. The program begins the test cycle by first examining the computer's RAM, then it performs three diagnostic tests on the selected drive. Compared with Drive7, Tool Kit PE was a speed demon, racing through a cycle of tests on my hard drive in about seven minutes.

Unlike Drive7 and Silverlining, Tool Kit PE comes only with a System 6 start-up disk. If you're running System 7 and you have only one hard drive, you have to create your own System 7 start-up disk in order to use the application.



Getting Personal The main interface of Hard Disk Tool Kit Personal Edition provides information about each SCSI device connected to your computer. Clicking on the icons at right activates the various maintenance procedures.

Silverlining

SILVERLINING ISN'T AS PRETTY AS ITS competitors; its lackluster interface is more confusing and less intuitive, but Silverlining offers a wider range of functions than either Drive7 or Tool Kit PE. It's also nearly twice the price.

Working from within Silverlining's Volume Manager window, you can rename volumes and customize their desktop appearance, choosing from 14 different icons (not as impressive as Drive7's 40-plus choices). The window also provides a graphic display of how a drive has been partitioned, showing the percentage of space allocated to each volume on a drive. Silverlining offers 32 partitioning-style options.

As with Tool Kit PE, you can change the size of volumes by clicking on the Size field and editing the number of kilobytes. The program tells you how much free space you have available for a new partition and lets you know how small the partition can be while retaining data stored within it.

Silverlining takes password protection a step further than Drive7 or Tool Kit PE. In addition to the usual volume-level password protection, Silverlining allows for the creation of master passwords, which can be used by a network administrator to override individual passwords; and Silverlining can open volumes even when an individual password is lost or forgotten.

The program is also unique in offering the capability of not only partitioning a single drive, but also of chaining together two or more drives into one logical drive—so two SCSI drives, a 40MB and an 80MB, can be represented on the desktop as a single 120MB drive.

Silverlining has extensive and detailed testing functions. You can run short or long versions of the drive tests. The short test, which involves reading and writing data to 16 disk sectors that have been set aside by Silverlining's formatter for testing purposes, took less than 2 minutes on my drive. The more comprehensive long test took about 11 minutes. If Silverlining's tests reveal that a file is written on a bad sector, a salvage function lets you resave the corrupted file to a more stable part of the drive.

A newcomer is apt to be befuddled by some of Silverlining's more advanced functions; it provides more options than most people need. Also, there's no online help at all, so you may have to do some research to decipher the significance of partition options such as "A/UX Root&Urs slice 0." On the other hand, La Cie is alone in offering its customers toll-free technical support (with a friendly, informed, and enthusiastic staff).

Volume Control You can lock individual partitions on a drive and set two levels of password protection through the Volume Manager window in Silverlining. Volumes also can be renamed from within the program simply by editing the Volume name field.

Included with Silverlining is Silver Volumes, a desk accessory that lets you mount, unmount, lock, or unlock volumes on a drive after start-up without opening the Silverlining application. You also get Drive Timer to test drive speed and a drive-duplication utility.

Any of these utility programs will keep your hard drive healthy—so which one should you buy? It's a tough call, but overall, Drive7 is probably the best choice, unless you absolutely require Silverlining's heavier-duty features. Drive7 offers the simplest and most polished interface, good online help, and the widest range of custom icon options. It also provides the most intuitive method for modifying partition sizes.—JOSEPH SCHORR

Storage System

PLI MiniArray 850MB; PLI MiniArray 2GB

PROS: Good performance on Photoshop benchmarks; toll-free technical support. **CONS:** Only slightly faster than a conventional drive with similar capacity; requires a NuBus slot. **COMPANY:** PLI (510/657-2211). **REQUIRES:** Any Mac with NuBus slot; System 7.0.1. **LIST PRICE:** MiniArray 850MB $4999; MiniArray 2GB $6999.

MW ★★★

DURING THE PAST YEAR SEVERAL vendors introduced storage systems called RAIDs—redundant array of inexpensive disks—that contain not one drive, but multiple drives that work as a single unit. Many of the drives promise increased data-transfer rates and shorter

continues

access times. And since some arrays write data to two arrays instead of one, they promise better data recovery. A few arrays even promise both high speed and data recoverability.

RAID drives fall into six levels—from Level 0 to Level 5—with Levels 1 through 5 offering different types of data-recovery schemes (see "High-Capacity Hard Drives," *Macworld*, May 1992). Both the PLI MiniArrays we looked at are RAID Level 0, which means they divide their data between two drives but do not provide data-recovery schemes. The biggest advantage of RAID Level 0 when compared with other RAID levels is better disk input/output (I/O) performance. This is achieved by splitting the data evenly over two drives, a process known as data striping. Since Level 0 drives don't implement any data-recovery scheme, if one drive fails mechanically, it renders the other drive(s) useless. Of course, this should not be a concern—the 850MB MiniArray uses two Fujitsu M2623S mechanisms, each with a mean-time-between-failure rating of over 200,000 hours. Since with two mechanisms breakdown is twice as likely as with one, this translates to over 100,000 hours between failures for the MiniArray 850MB. The DEC Drive–based MiniArray 2GB mechanism is even more impressive—over 125,000 hours between failures.

In terms of performance, the MiniArray turns in excellent results on the low-level tests—as we had expected, since the QuickSCSI board uses a faster SCSI chip, which lets the drive bypass the slower IIci SCSI port. But in our real-world tests, the MiniArrays are not as impressive. We compared the two drives with a Storage Dimensions 800MB DEC-based mechanism on a IIci. Out of all the Macworld Lab application tests, the only benchmarks where the MiniArrays performed significantly better than the conventional drive was opening and saving large (20MB) Photoshop files. The Storage Dimensions drive actually beat the MiniArrays in a couple of performance tests. And the Storage Dimensions drive costs $1600 less than the MiniArray 850MB.

We also tried our benchmarks on the inner tracks of the MiniArrays. To achieve maximum density, most conventional high-capacity drives use a variable zone-recording technique that places more sectors on the outer tracks of the disk platters than on the inner tracks. Since the rotational speed of the platters is constant, more sectors can be read or written on the outer tracks during a revolution than on the inner tracks. In our tests we saw up to a 15 percent speed degradation on some drives when we wrote to the inner tracks. The MiniArrays, however, showed consistent performance across all usable areas.

The MiniArrays ship with a NuBus-based QuickSCSI board to handle a transfer rate of up to 5MB per second; a special SCSI-2 cable; and various PLI software utilities. The drives' footprint is almost identical to that of a IIci or IIcx—oversized compared with the single-mechanism high-capacity drives available from other manufacturers, but the MiniArrays have a lower profile (they're 2 inches high) than RAID drives from other vendors, and the MiniArrays sit nicely under a 14-inch monitor. Another nice feature is that they use external DIP switches for termination. Instead of adding or removing a terminator, you flip the switches to the on or off position. A rotary switch is provided for SCSI ID selection.

Installing a RAID drive is not as simple as installing a conventional drive. To set up the MiniArray, we first had to install the QuickSCSI board into a NuBus slot. We then connected the MiniArray to the QuickSCSI board with the supplied SCSI-2 cable. With the board installed, an additional six SCSI devices can be hooked up through the SCSI port on the back of the MiniArray. We had to install the QuickSCSI INIT on the start-up disk.

There are a few drawbacks to the MiniArray. Like most RAID Level 0 systems for Macs other than the Quadra 900 and 950, the MiniArray uses a NuBus slot for the adapter board, which means the slot can't be used for anything else. And since the MiniArray works only if connected to the QuickSCSI board, hooking up the drive to another Mac means removing and installing the adapter board and installing the INIT—cumbersome in this plug-and-play world.

To configure the MiniArray as a start-up drive, you must use the QuickSCSI Manager utility instead of selecting the drive from the StartUp Disk control panel. With QuickSCSI Manager, you can also set up additional hard drives on the same QuickSCSI bus as mirror drives. That means any changes made to the main drive will be replicated on the backup drive. If the main drive fails, you can bring the backup drive online immediately. The mirroring options of QuickSCSI Manager, however, do not support the MiniArrays. PLI promises a fix to support mirroring to or from a MiniArray by the time you read this.

PLI also includes Finder Improve, an application that allows you to adjust the number of blocks available for data transfer within the Finder. The unmodified Finder transfers data in 32 (512-byte) blocks. With Finder Improve, you have the options of setting 200 (100K) blocks for reads/writes or using all but 20K of the available RAM for read/write transactions (called Infinity). Macworld Lab benchmarks showed a major improvement in duplicating files and folders from the desktop with both of these settings. Other tests, such as loading Photoshop files, showed no improvement at all. Finder Improve is not recommended for use with System 7.0's virtual memory.

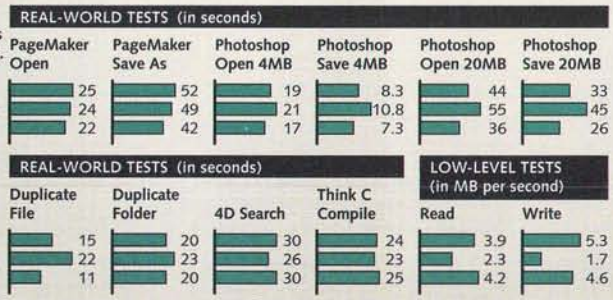
The MiniArray comes with a one-year warranty, and PLI offers a toll-free support line.

The MiniArray is an excellent choice for image processing or any other task that involves importing and exporting large files. Unfortunately its price per megabyte is a lot higher than that of most drives. If you're on a tight budget, you should probably check out some of the fast conventional drives instead.

—MARK HURLOW AND DANNY LEE

MW LAB MiniArray Benchmarks

Shorter bars are better for real-world tests. Longer bars are better for low-level tests.



We used SCSI Evaluator to measure the drives' read/write performance. Due to the QuickSCSI's faster SCSI chip, both MiniArrays achieved a transfer rate much higher than that of the drive connected to the IIci's native SCSI port.

For real-world tests, we measured each drive's speed in duplicating a 3.2MB file and a 3.2MB folder; searching a 4D database for a record; compiling a Think C program; opening and saving a PageMaker file; and opening and saving a 4MB and a 20MB Photoshop file.

The MiniArrays outperformed the Storage Dimensions drive in opening and saving the 20MB Photoshop file. All other tests showed no performance benefits of an array over a conventional drive.

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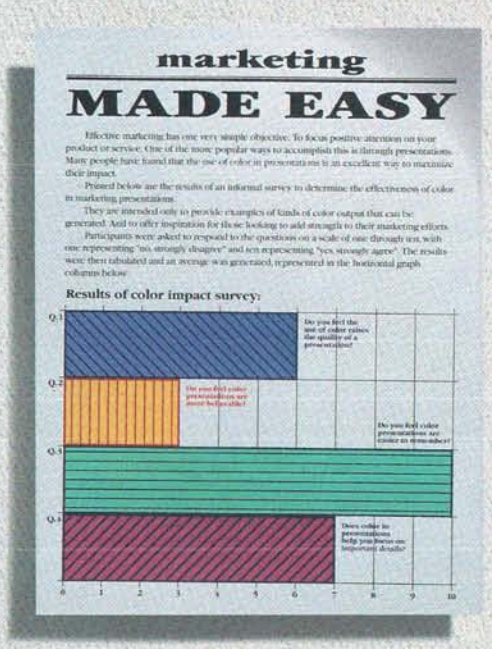

marketing

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Effective marketing has one very simple objective. To focus positive attention on your product or service. One of the more popular ways to accomplish this is through presentations. Many people have found that the use of color in presentations is an excellent way to maximize their impact.

Printed below are the results of an informal survey to determine the effectiveness of color in marketing presentations.

They are intended only to provide examples of kinds of color output that can be generated. And to offer inspiration for those looking to add strength to their marketing efforts.

Participants were asked to respond to the questions on a scale of one through ten, with one representing "no, strongly disagree" and ten representing "yes, strongly agree". The results were then tabulated and an average was generated, represented in the horizontal graph columns below.

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QuickTime Video-Editing Software

Adobe Premiere 2.0

PROS: Produces stunning special effects with little effort; outstanding new animated-titles generator; exports to Photoshop for frame-by-frame editing; provides support for high-end pro equipment. **CONS:** Slow; heavy equipment demands; no quick way to view movie during editing; incomplete, unpolished manual.
COMPANY: Adobe Systems (415/961-4400).
REQUIRES: Mac II; 4MB of RAM; QuickTime movie source; System 6.0.7. Recommended: IIci; 20MB of RAM; 32-bit color; System 7.
LIST PRICE: $695.

MW ★★★★

ADOBE PREMIERE 1.0 WAS THE FIRST program that could edit QuickTime movies, the digital video format that plays color-and-sound movies on the Mac's screen. Premiere was so unusual and so promising that it earned the highest possible rating in its *Macworld* review, despite a thrown-together manual, no easy way to scroll through a movie, and a slow Preview feature that discouraged quick screenings of the work in progress.

Now, as the novelty of QuickTime has begun to fade, and with competing programs available, Premiere 2.0 debuts with a 10-foot stack of new features. It has become a dream command post for the video professional. Only the program's appetite for memory, disk space, and computer horsepower keep it from being a dream for the nonprofessional.

Clip Joint

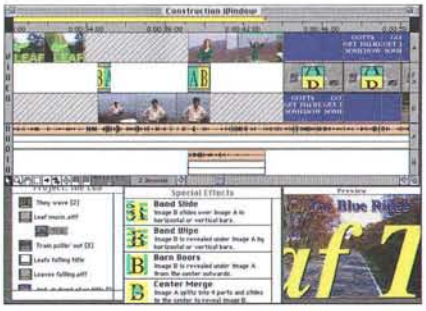
JUST LIKE VERSION 1, PREMIERE 2.0 eats, sleeps, and breathes *clips*—raw-footage QuickTime files that you import, individually or by the folderful, into the program. In version 2, you can record clips directly into Premiere, if you have a digitizing board installed in your Mac and an accompanying software module called a VDIG. (SuperMac VideoSpigot owners should avoid this method, however; it results in movies with only about half the frame rate of movies you record in the VideoSpigot's ScreenPlay program.) You can also record audio into Premiere but not with a MacRecorder, which produces only crashes and glitches. (Adobe blames Macromedia).

Once you've imported a clip, you can manipulate it in an astounding number of ways: drag it to play before or after other clips; shorten it; make it play faster or slower; apply a Photoshop filter to it; play it backwards; superimpose text or video over it; make it spin, tumble, or rotate; or have it cross-fade to another clip, using any of 49 professional-looking transition effects (including dozens of new ones). Split-screen, scrolling credits, and TV-news-weather-map-style chroma-key effects are easy and gorgeous.

Unfortunately, Premiere still doesn't let you work with individual frames. To delete frames from the middle of a clip, for example, you have to create two copies of the clip, and truncate their endpoints to eliminate the unwanted material. Similarly, you can only apply a special-effect filter to an entire clip; to affect just part of a clip, you must first chop the clip up into multiple clipettes.

To construct a movie, you arrange clips in a time-line view called the Construction window. The Construction window offers seven parallel horizontal tracks: two for video clips, three for audio, two for effects. Because your movie is laid out horizontally, you'd need a monitor 750 feet wide to display every frame in a five-minute movie. Therefore, you spend much of your editing time just getting around in the horizontal landscape. Premiere 2.0 offers two alternatives to the sluggish scroll bar, which used to be the only navigational control. First, you can now place nine markers at various points in the movie; you jump to a marker simply by pressing the appropriate number key on your keyboard. Second, the Go To command scrolls the Construction window so that a certain moment of your movie (which you specify in minutes, seconds, and frames) falls somewhere on your screen.

When you look at the Construction window, you can't see the effects of any filters you've applied to a clip—a clip you've made brighter, for example, still looks dark. You must play the movie to see what you've got; and as in version 1, each of Premiere's playback methods has limitations. The first method is to compile any stretch of your movie into a finished QuickTime file. This lets you play everything—effects, sounds, and smooth motion—but it takes a huge amount of time (several minutes to produce several seconds of preview). That's scarcely conducive to making quick progress checks. Second, you can select a portion of the Construction window and use the Preview command. This method involves a shorter waiting period, but the resulting playback is choppy and crude, particularly where you've applied effects, which can make Preview playback grind to a complete halt. (I'm told that the preview smoothness is much better if you have 20MB of memory, a Quadra, or both.)



Construction Sight At top: the Construction window, where video clips are arranged as filmstrips, separated by a track that governs how one clip cross-fades into another. At the right side of the screen, some text is scrolling up the screen. At the lower-right is the Preview window, showing a title that's flying off the screen.

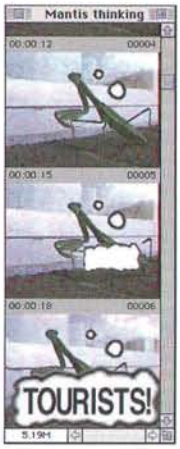
The third method of in-progress movie playback is new in 2.0: you can drag the cursor through the top of the Construction window—even "scrub" the cursor back and forth—and watch the video beneath the cursor play in the Preview window. Again, the playback is halting and intermittent, and you don't hear sound. Premiere, like its still-motion cousin Adobe Illustrator, forces you to do your creative work in a symbolic mode, and gives you only glimpses of your final product as a separate, uneditable Preview.

Sound and Glory

AFTER YOU MOCK UP YOUR FILM, YOU USE the Make Movie command to compile the complete video masterpiece—a process that may take several hours to create a five-minute movie. People who have either patience or Quadras aren't likely to complain, however: Premiere produces absolutely spectacular results. The new title-creation window is a work of art. You can create text that spins; grows; fades; or flies across, inside, or outside of the video picture. A new Motion control gives you that same flexibility for the clips themselves. Using a wonderfully graphic and intuitive display, you can program a piece of video to slide across the screen in any direction, along any path, and change its angle, size, or speed at any moment during its pilgrimage.

And Premiere's juiced-up mat features give you astonishing control over the transparency of superimposed graphics or clips. One setting, for example, lets one video clip shine through just the stationary portions of another clip, so that you can make your aunt appear to jog through, say, original footage of June Cleaver's kitchen.

What rates only a passing mention in the manual is actually a breakthrough feature: a command that exports a clip to Adobe Photoshop. Using Photoshop's powerful painting tools, you can edit each individual dot of each frame—and then



Film Strip

reimport the clip to Premiere (see "Film Strip"). You can now retouch video the same way you retouch photographs with Photoshop—edit a particular person out of the scene, for example, or change the hands on a clock face. Although the process is incredibly tedious—remember, you have to edit every one of 15 or 30 pictures for each second of finished video—the possibilities are mind-blowing.

At the High End

PROFESSIONAL VIDEO PERSONNEL HAVE a lot to look forward to. Premiere can now control a number of professional video decks (DiaQuest systems, Sony's Hi-8 ViSCA machines, and others). It can also generate an Edit Decision List, a series of text codes used in postproduction studios that documents each cut, fade, and edit. (Premiere can even save an EDL in a format readable by machines that then automatically construct the movie you've mocked up using QuickTime.)

Some of Premiere's new features anticipate QuickTime products that don't exist yet. Premiere can support 16-bit, CD-quality audio (if you have a digital-audio board)—but QuickTime 1.0 doesn't, so the feature is meaningless until QuickTime 1.5 (and a new version of Apple's Sound Manager) is released. The Create Miniatures feature will mystify you at first—it creates saltine-size versions of your saltine-size clips. And then you realize that a new generation of QuickTime digitizing boards is being readied (such as SuperMac's Digital Film and RasterOps' MoviePack), which will play 30-frames-per-second QuickTime movies the size of the entire Mac screen. When they're available, working with miniature clips will save hours of processing time while you edit.

Premiere, the *software*, is exciting. The rest of the package—including the two slabs of foam rubber meant to make the box seem more imposing—needs some attention. The help-line staff, while easy to reach, is unfamiliar with the new features. Worse is the abrupt, almost cynically slapdash 150-page manual, which rattles off feature lists without indicating their usefulness or meaning. Descriptions of some features and techniques are missing completely. Not a word appears about the new MIDI music-file playback feature; about closing the gap created when you delete a scene; and so on.

On any Mac less powerful than a IIci, using Premiere 2.0 involves more waiting than editing. But owners of memory-packed Mac IIfx's and Quadras, users of Mac-controllable video decks, and future owners of Digital Film (and other high-end QuickTime boards) should consider Premiere mandatory. If you appreciate the program's new high-end slant, then buy it, and stun the world with a premiere of your own.—DAVID POGUE

9600-bps Modem

WorldPort 9600 Data Modem

PROS: Compact; battery-powered; MNP Class 5 data compression. **CONS:** Poor indicator display; weak documentation; erratic behavior; bundled software for PCs only. **COMPANY:** U.S. Robotics (708/982-5001). **REQUIRES:** Mac Plus; modem cable; telecommunications software. **LIST PRICE:** $475.

MW ★★

JUST 1 INCH HIGH AND SLIGHTLY larger than a deck of cards, the WorldPort 9600 is a lot of modem in a little package. The pocket-size unit transmits data at a brisk 9600 bits per second and can employ MNP Class 4 error correction and MNP Class 5 data compression when connected to another modem supporting those features. Unfortunately, U.S. Robotics seemingly chose to ignore the Mac market when designing and packaging this modem, making it a less-than-perfect match for a PowerBook.

Everything about the WorldPort is geared toward PC users only. The user's guide does not mention Mac computers even once, so you're left on your own to figure out what kind of cable you need to connect the modem to a Mac (only a PC cable is included). As it turns out, you need not the standard Mac modem cable, but a high-speed "hardware handshaking" cable to use the modem's high-speed data-compression features. Unfortunately, this isn't mentioned in the manual. And the WorldPort comes bundled with a full-featured telecommunications software package—but only for IBM PCs and compatibles. No Mac version of the software is even offered.

Then there's the mystery of the acoustic coupler. The modem box says an acoustic interface adapter cable is *included* that lets you call from telephones lacking the standard RJ-11 jack. Open the box and you find not only that the cable doesn't exist, but also that the jack into which the cable is supposed to be plugged has been sealed, without explanation.

Some of these problems probably stem from the WorldPort's hybrid origins. U.S. Robotics bought the WorldPort from Touchbase Systems in 1991, added MNP Class 5 to the modem, and started selling it. But the souped-up version of the modem had so many problems, the company had to redesign it immediately and in August 1992 started shipping a new version with different features—in the old box. (Owners of the first MNP Class 5 version of the modem can upgrade to the current version for $59.)

Once the modem was connected with the proper cable, the redesigned WorldPort provided reliable data communications, particularly when connecting with BBSs and online services at 2400 and 9600 bps. The WorldPort supports communications from 75 bps to 9600 bps and readjusts its own speed to match. With MNP Class 5 data compression enabled, the WorldPort always tries to negotiate an MNP 5 link, then drops down to non-MNP mode if necessary.

During some Mac-to-Mac communications, the modem behaved erratically. The Carrier Detect LED sometimes remained on after hanging up. And despite the error-correction features, the modem occasionally spewed lengthy lines of garbage characters amid my 9600-bps communications.

Still, the WorldPort is outstanding for its portability. The modem operates on a standard 9-volt battery. With the battery installed, the modem powers up automatically as soon as you load your telecommunications software and shuts itself off when you quit the program. In a world where batteries are almost never included, it's refreshing to find two alkaline batteries along with an AC adapter.

The WorldPort has only four tiny LED indicator lights—so, you don't always know what's going on during a session. No indicators flash to show when the modem is sending or receiving or when the phone is off the hook. The indicator lights that are there seem needlessly cryptic. For example, according to the manual, when the Low Battery LED is off, it means either "battery is OK" or "a completely dead battery is installed."

And, by the way, expect that "completely dead" message often; the WorldPort peters out pretty quickly on battery power. The user's manual says to expect two to three hours of use on a fresh battery. In my tests, batteries lasted only about an hour or so.—JOSEPH SCHORR

Programmer's Editor

Object Master 1.0.2

PROS: Complete, customizable editor for C, C++, Pascal, Modula 2; project-management tools; Smalltalk-like browsers. **CONS:** Minor bugs. **COMPANY:** ACIUS (408/252-4444). **REQUIRES:** Mac Plus; 2MB of RAM; 4MB of RAM for System 7; hard drive; System 6.0.5. **LIST PRICE:** $395

MW ★★★★

PROGRAMMING MACINTOSH APPLICATIONS was difficult from the start and got harder as the Mac family expanded; the ease of use you enjoy in Mac applications dictates extra challenges for the programmers who write them. Over the years, programmers have narrowed down the set of capable programming tools to a mere handful—the MPW (Macintosh Programmer's Workshop) products, Symantec's Think C and Think Pascal, Metrowerks's Modula 2, and versions of Smalltalk from Digitalk and ParcPlace.

Object Master from ACIUS is an attempt to combine the superior object-management facilities typically found in Smalltalk with a first-rate programmer's editor, and bring the whole package to the most popular languages—C, C++, and Pascal (Modula 2 with P1 object extensions are also included). Object Master started life as the personal project of Loïc Vandereyken, a software engineer at ACIUS, but was soon found so valuable that many programmers began using it in-house, and then it was dressed up a bit, outfitted with a manual, and released as a commercial product. Although this mode of product development may sound informal, it has yielded the advantage of unbeatable telephone support—typically you talk to Mr. Vandereyken or product manager Mike Graves, who both can answer questions authoritatively and also write small bug-fixes and send you the modified code.

The first recommendation for Object Master is its editor, which will also be useful to non-object programmers. Besides automatically adapting to the format conventions of specific languages, it supports customizable search and replace. You can paste procedure and method calls by name, with Object Master automatically searching your project's dictionary and the related MPW 411 files for templates. The second strong point is navigation capability. The Browser window displays scrolling lists of the classes, methods, and fields used by a project, with a separate on-screen editing area that brings up the text of highlighted methods. All types of modification of objects and methods can be performed directly through editing or menu choices in this window. Object Master here also includes some conveniences for non-object work—Pascal records and C structs in procedural programs will appear in class lists as bulleted pseudoclasses, for example. The Class Tree window displays the class hierarchy in a variety of ways (you can collapse, expand, and change node presentation), and lets you enter the hierarchy at any point, so the Tree window becomes an overview working with the Browser. Finally, the project Make/Build facilities, which work with MPW Shell 3.3 ToolServer and the Incremental Build System from Jasik Systems, are particularly efficient. I used to think I would be happy with Think C's admirable project-management tools, but Object Master simply has more power—under System 7, for example, it can use Apple events to communicate with ResEdit 2.1.1 (the Resources Map itself is pretty helpful, too).

Developers are uniformly enthusiastic. John Penn, a custom-application programmer with Anapra (in San Diego), says that he uses Object Master constantly and is still finding goodies scattered throughout the program. Everyone we interviewed reported serious time savings on large projects. At $395 Object Master is not for hobbyists, but professionals are unlikely to want anything else.—CHARLES SEITER

Historical-Simulation Game

The Battle of Britain

PROS: Easy to play; entertaining format; educational. **CONS:** Takes too long to complete game. **COMPANY:** Deadly Games (215/295-2284). **REQUIRES:** Mac Plus; 2.5MB of RAM; System 6.0.5. **LIST PRICE:** $54.95.

MW ★★★

ALTHOUGH AT FIRST GLANCE YOU might take Rene Vidmer's The Battle of Britain for just another World War II flight-simulation game, this is a thinking person's game. It pits your military skill against the Mac's in a simulation of one of the critical battles of World War II. If you're in the market for an entertaining, easy-to-play military-strategy game—one that forces you to act and react quickly to sudden attacks—look no further.

The Battle of Britain opens to a map of southern England and eastern France on August 10, 1940. For the next month, the German Luftwaffe launches a relentless air attack on the British homeland. From your post at the underground Operations Theatre at Uxbridge, you take command of the Royal Air Force and its defenses. Using intelligence reports, radar, and a map table similar to the one that was used in 1940, your job is to turn back the Luftwaffe and save England.

For each raid you turn back, and for each day you survive, you gain points. The Germans score points for putting British squadrons out of action, launching bombing raids, and disabling air bases. If by September 10 you've amassed more points than the opposition, you win. A 50-point win qualifies as a major victory.

It's a good idea to read through all the reports and then determine just how many squadrons to send on patrol. Although you can patrol all the squadrons, it's more prudent to conserve your fighters. The reports don't tell exactly which targets the Germans will attack, but they do offer a good indication of their intentions for any given day of the campaign.

And on the Second Day The Radio Direction Finder was unable to detect an attack, and after a successful bombing raid on Canterbury, the Germans take a 6-to-4 lead.

As they were historically, the British are badly outnumbered, so you should rely heavily on intelligence reports and detection—the Radio Direction Finder (RDF), England's early radar, and the Observer Corps (OC), both authentically re-created for The Battle of Britain. At the beginning of each day, check the Ultra reports at the top of the map. Reports from the RDF and OC may flash on screen at any time. It's better to get the RDF reports first because they give you enough lead time to get standby squadrons into the air and to move patrols to intercept the oncoming attack. You can move any squadron 20 miles in any direction by clicking on it and moving it with the mouse. Unfortunately, sometimes the OC's warnings are the first you receive, and then you're in trouble because by that time the Germans are already over land, and it's too late to move any patrols.

The Battle of Britain fills only about three-quarters of my Mac LC's screen—a minor quibble, but it was sometimes annoying. Nevertheless, even though the graphics and sound on The Battle of Britain are not spectacular, I recommend the game. What it lacks in aesthetics it makes up for in strategy, historical insight, and entertainment.—ANDREW MILLER

Tool for Creative Inspiration

IdeaFisher 2.0

PROS: Well-researched, well-designed resource for creative problem-solving; fun to use. **CONS:** Interface could be improved; needs lots of hard drive space. **COMPANY:** Fisher Idea Systems (714/474-8111). **REQUIRES:** Mac Plus; hard drive with 7MB of free space; System 6.0. **LIST PRICE:** $595.

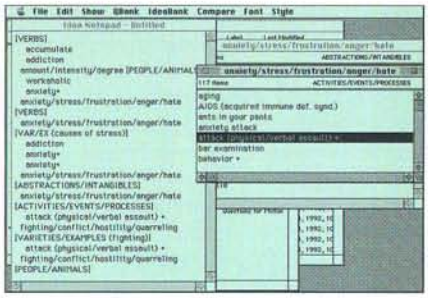
MW ★★★

IDEAFISHER WON'T MAKE CREATIVE geniuses of us all, but if you cast a line into its QuestionBank or IdeaBank, you might reel in some inspiration.

If you favor a left-brain, analytical approach to creative problems, the QuestionBank of 6000 questions is the place to start. After choosing Orient/Clarify from the QBank menu, you select from a list of possible projects—a story or script, ads and promotional materials, a name, new products and product improvements, a marketing strategy, or general problem-solving.

Being a writer, I chose a story or script, which led to questions such as "What is your premise?" and "What is the first line spoken, pointing to the conflict through which the premise will be ultimately proven?" Since fiction writers often stare at the dreaded blank page with only an image, scene, or character in mind, questions like these can provide a jump start. After answering a number of them, you'll at least have an idea of what you know and what you need to figure out. For example, you may know that your protagonist is a detective in Detroit, that he's newly married but still haunted by a previous marriage, and that his ex-wife asks him to find her missing lover. You may not know who the missing lover is, why he's missing, or how the detective's marital relations will play out, but at least you know what you still have to think about. As your story progresses, you may return to the QuestionBank to generate a new list of relevant questions. The QuestionBank's conflict-resolution story mode makes it more helpful to an Elmore Leonard than to a William Burroughs.

You can take a more right-brain, intuitive approach by going straight to the IdeaBank, typing in one of its 61,000 words, and clicking through its 700,000 associated links, somewhat the way you'd meander through *Roget's Thesaurus* (a real Roget's, not just a synonym finder). Beginning with *anxiety*, I proceeded to *crowd of people*, *tension*, *accumulate*, *addiction*, *altered state of consciousness*, and *bludgeon*. (If I throw in a few diced-up women, I might have the next hit slasher film.) Success in creating ideas depends on having the kind of mind that makes connections and elaborate images.



Achieving the Aha! Experience Type one of 61,000 idea words into the Idea Bank, then associate your way to a story or script, ad campaign, marketing strategy, or product name.

Don't expect IdeaFisher to help you meet tomorrow's deadline; it'll be at least a week before you know the program well enough to wrest an idea from an inkling, despite good tech support. Improvements to the interface would help—switching from cursor keys to the mouse when you switch windows slows your reflexes.

For me, the IdeaBank is much more fun than a computer game, and the QuestionBank is provocative, but I'm still hesitant to put this much technology between me and my imagination. In the end, the value of any brainstorming package depends on the brain doing the storming.—ANN GARRISON

Fax Modem

Viva 14.4/Fax

PROS: Works well in data mode; good documentation. **CONS:** Barely adequate software. **COMPANY:** Computer Peripherals (805/499-5751). **REQUIRES:** Mac Plus; hard drive; System 6.0.2. **LIST PRICE:** $469.

MW ★★

THE VIVA 14.4/FAX MODEM SENDS AND receives data and faxes at 14,400 bps. The data side includes the modem, MNP 4 and V.42 error correction, and MNP 5 and V.42bis data compression. The modem can send and receive Group III faxes at 14,400 bps and 9600 bps, as well as at the older, slower fax speeds. The package includes a cable, a power adapter, and software.

As a data modem, the Viva 14.4/Fax performs well. I was able to connect to several other modems at data speeds of 14,400 bps, 9600 bps, and 2400 bps. Once connected, the Viva modem automatically negotiates the maximum transmission speed possible with the other modem. Because of the data-compression features, the top data-throughput speed is theoretically 57,600 bps, but in the real world no modem reaches this speed. The Viva 14.4/Fax is no exception; in my tests I reached a maximum throughput of 18,500 bps. This is lower than the average maximum throughput I reached testing other 14,400-bps modems, such as Supra Corporation's SupraFax-Modem V.32bis and Global Village Communication's PowerPort/Gold. The average throughput of those modems was approximately 25,000 bps on the same test files.

The software bundled with the Viva 14.4/Fax is Quick Link II Fax by Smith Micro Software. It is, quite simply, bad software. Though it works most of the time, it lacks features found in other communications packages; the fax features are less than ideal. For data, the program includes the Xmodem, Ymodem, and Kermit file-transfer protocols but not the more useful Zmodem. I was unable to obtain successful Ymodem transfers, even though I tried sending from three different brands of modem. Xmodem transfers with Quick Link II Fax were about 30 percent slower than with the Viva modem using Software Ventures' MicroPhone 1.7, a limited version bundled with other manufacturers' modems.

Faxing should be almost as easy as printing, but the Quick Link II Fax software makes it just a bit harder. You need to choose the fax driver, QL Fax Print, in the Chooser before you fax; and there is no keyboard shortcut for temporarily selecting the fax driver. You must also go through two or three dialog boxes to address the fax. In my tests the fax software froze twice while trying to send. Received faxes didn't fare well, either; on three multiple-page faxes, when I tried to read the received fax on screen, one or more of the pages had been squashed down to one line, making the received fax useless. The Quick Link II Fax log had reported that the fax had been received OK, however. Add to these problems an interface design that I can charitably describe as clunky, and it's clear that Quick Link II Fax is a program that increases the user's frustration. I discovered that the Viva hardware works with Fax/stf fax software, which is sold by STF Technologies and bundled with modems from Supra, PSI Integration, and others. This software is far superior to Quick Link II Fax in ease-of-use and in features. In fact, if you buy a Viva 14.4/Fax, I suggest you throw away Quick Link II Fax and replace it with Fax/stf.

The manual for the modem is good, and technical support is adequate but hard to reach. There is an 800 number for tech support, but it's usually busy. I was only able to get through once in several calls.

Because Quick Link II Fax is bundled with the unit, I would not recommend the Viva 14.4/Fax unless you are prepared to make the extra investment in better data and fax software.—TOM NEGRINO

Application-Design Environment

Serius Programmer 3.0

PROS: Requires almost no programming knowledge to build simple applications; toll-free tech support. **CONS:** Program functionality is constrained by the object designers; too few examples in documentation, complex programs may need optional object sets. **COMPANY:** Serius Corporation (801/261-7900). **REQUIRES:** Mac Plus; hard drive; System 6.0.2. **LIST PRICE:** $595.

MW ★★★

EVER SINCE THE FIRST COMPUTER was invented, there have been attempts to simplify programming it, while making the programs more powerful. The Macintosh introduced programming using graphical elements instead of text. Serius Programmer's graphical approach gives nonprogrammers tools for creating custom software.

You have to learn Serius's specialized vocabulary. A *project* (read: *program)* consists of *objects* and *functions*. An object can be as simple as a text string, or as complex as a window in a paint program. Each object type has its own unique set of functions that operate on it. A complex project can be broken into *subjects*—user-defined collections of objects and functions.

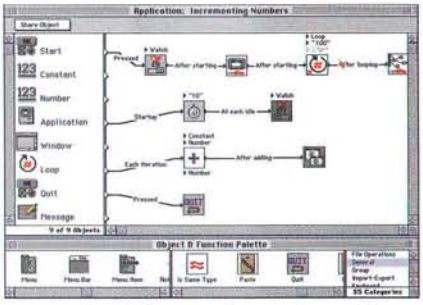
A program starts as a collection of related objects. For example, you might begin with menu bars, each of which also includes commands. Typically you then define windows and various data entry fields and buttons in them. Next you connect functions to these objects to control your program's behavior. For instance, you can attach window-opening and -closing functions to menu commands. For more-complex operations, you can chain functions together; say, close a window, open a Save As dialog box, and write the window's contents to a file.

Serius Programmer includes more than 400 functions and 30 object types—basic Mac interface objects (such as windows) for building simple applications. There are separate object sets for database operations, multimedia, communications, XCMDs, and interapplication communication.

Be aware that with a program like Serius you must give up some control over program behavior and accept the designer's vision of how objects should work. For example, the Serius Database's table object lets you browse a group of records in columnar format only.

Serius's documentation skimps on critical explanations and examples. A typical reference section explains an object and the functions for that object but not how the object behaves with its functions. The sample programs are all trivial. The database table documentation is particularly weak.

For simple data-management tasks, FileMaker, Excel, or Works may be better choices—they're much easier to learn, and many nonprogrammers know them already. For more-complex software, you'll probably call a professional. Still, Serius Programmer is good for prototyping programs and perhaps developing in-house programs for corporations, and it enables nonprogrammers to create simple custom applications.—STEVE MANN



Connecting Objects and Functions To create an application, you drag objects and functions from the Object & Function palette (bottom) to the object area on a subject's window, then connect functions to objects and to each other by pointing and clicking.

Medical Reference on CD ROM

Stat-Ref 3.2

PROS: Can mark citations for future retrieval; simple interface. **CONS:** No Boolean operations; no images in current version. **COMPANY:** Teton Data Systems (307/733-5494). **REQUIRES:** Mac Plus; 2MB of RAM; CD ROM drive; System 6.0.5. **LIST PRICE:** $95.

MW ★★★

STAT-REF CONSISTS OF A MEDICAL database on CD ROM, and an application that lets you search by keyword. The $95 fee buys the Stat-Ref program and one year of tech support. For $200, you get a subscription to a CD ROM library of journal abstracts for one medical discipline, such as cardiology. (The company plans to release libraries for other specialties.) Each library includes abstracts from the past ten years of the National Library of Medicine's MedLine database; four quarterly updates are included in the subscription price.

In addition to journal citations, Stat-Ref offers full-text versions of selected books and references such as *The Medical Letter*, *Stedman's Medical Dictionary*, and the popular Appleton and Lange series. Costs range from $35 for most of the Lange titles to $395 for a one-year subscription to reviews from the *Scientific American Medicine*, updated quarterly. Fortunately, you don't have to purchase a separate CD ROM for every book—you can order code numbers to unlock titles on the disc by calling Teton's toll-free number.

Stat-Ref's search interface is easy to use, but somewhat limited. After selecting textbooks or journals to scan, you search using keywords. The software doesn't understand Boolean operators like NOT, so you can't automatically exclude references that contain specified keywords. And while you can tell Stat-Ref to automatically look for words with common roots (like *infarct* and *infarcting*), true wild-card characters aren't recognized, so you can't search for words that begin with a given text string.

The next step is to scan. At the lowest precision level, Stat-Ref finds every reference that contains at least one of your keywords; the highest level requires that all the keywords appear adjacent to one another.

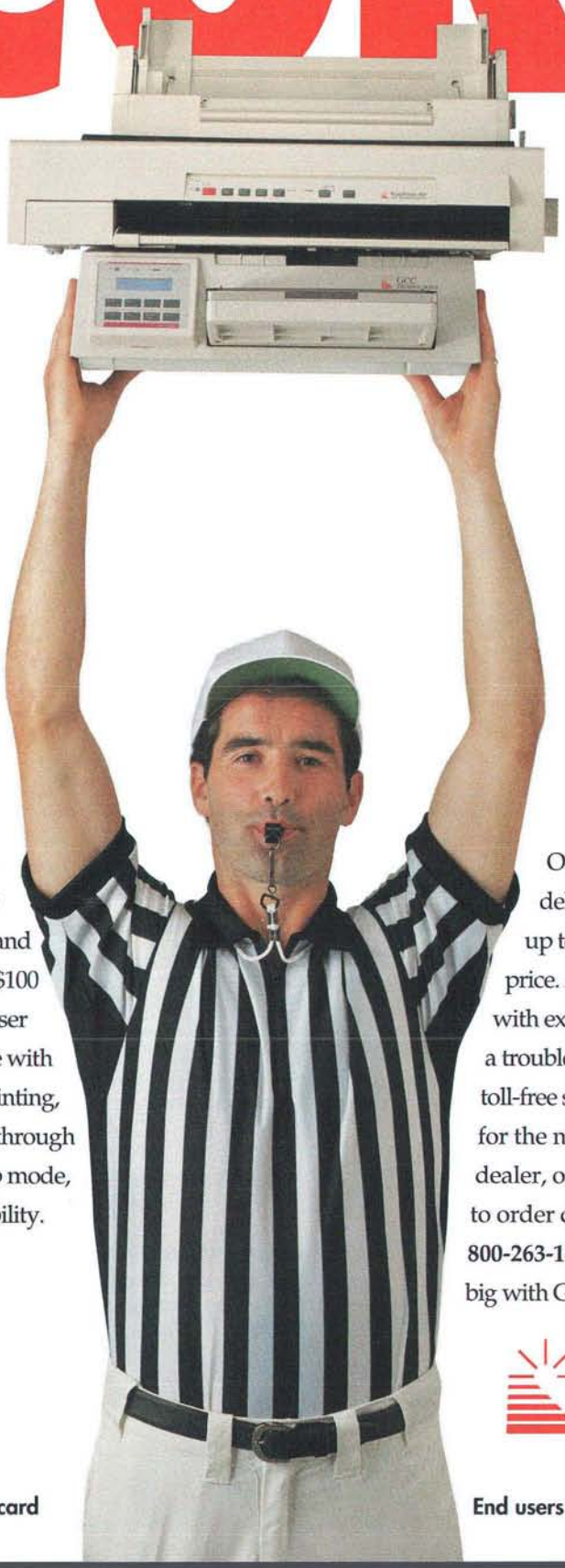
Stat-Ref gives you two options for displaying references. If you expect to find a large number of citations, choose Match Summary, which presents a list of references in outline format. Each journal or textbook appears only once, with the number of matches shown in brackets next to the title. To view the reference text, you expand the outline and display the subitems.

For more-limited searches, Stat-Ref's Smart Match feature lists all of the relevant citations sequentially. In either case, double-clicking on an item retrieves the associated textbook section or journal abstract and presents it in a separate window. (This release can't display pictures or drawings, a feature that's planned for future versions.)

Stat-Ref lets you mark up to 50 citations with electronic bookmarks, saving you the trouble of repeating a search later. And if you simply want to browse, you can display textbooks and journal abstracts in outline form.

In my trials, Stat-Ref found references rapidly, although complex searches took longer. To make things faster, I took the manual's advice and copied the libraries' outline files to my hard drive. Although this lessened search times, just one of the outline files took almost 12MB of hard drive space. Because Stat-Ref provides access only to limited sets of journal citations, it's not well suited to searches for research or publication. What it can do is replace a small reference library in an office or hospital-ward setting. Although Stat-Ref's search options are less comprehensive than some other medical-reference databases', Stat-Ref is easy to use and relatively fast. If you want reference texts that include a lot of pictures, though, you may want to wait for a future version.—FRANKLIN N. TESSLER, M.D.

SCORE!



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Flowchart Software

FlowChart Express 1.0

PROS: Inexpensive; horizontal and vertical split screens; automatic backup files; objects can be nudged, even with grid snap on; comments can be attached to symbols as note cards. **CONS:** Must reset defaults for each chart; text wrap within decision symbols sometimes requires manual adjustment; no selective symbol shadowing. **COMPANY:** Kaetron Software Corporation (713/890-3434). **REQUIRES:** Mac Plus; System 6.0.5. **LIST PRICE:** $149.

MW ★★★

FLOWCHART EXPRESS IS FOR PEOple who don't need all the features of Kaetron's more powerful flowchart program, TopDown. It has the tools you need to create process flowcharts and organization charts easily. Only users with expansive requirements will feel hampered by the feature list.

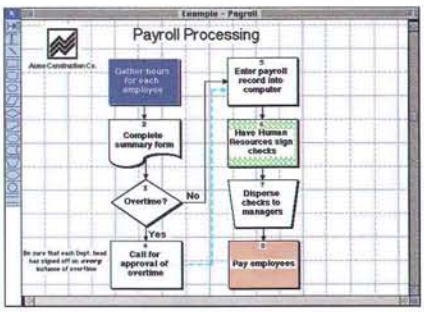
If you're familiar with any draw-style graphics program, you'll have little trouble with FlowChart Express. You construct flowcharts by selecting any of a dozen standard flowchart symbols, such as input/output, decision, and process symbols, from a palette and connecting them. Each symbol, connecting line, and text string is an object that you can move, resize, or color.

Options to display a grid and snap objects to the grid let you easily arrange objects on the page. You can also use the arrow keys to nudge objects into place, even overriding the snap-to-grid setting. You can align elements with each other or with the grid. Text wraps automatically within symbols (except in the diamond-shape decision symbols, where you sometimes need to manually readjust text to keep it inside).

You can set defaults for options such as symbol size, text font and style, and line-connection style before starting the chart. But you can't save a general set of preferences for all new charts; you must reset the options for each new chart. (Under System 7 you can save chart documents as stationery and reuse your preferred settings.)

You can attach comments to any symbol in a pop-up note-card window. Since they are normally hidden, note cards are great for documenting steps in a process without cluttering the flowchart. FlowChart Express has no drawing tools, but you can paste graphics created in other programs into your charts. You can also use pasted graphics as custom symbols. Symbols can be displayed as standard outlines or with shadows. Shadowing, however, cannot be selectively applied—it's all or nothing.

To make it easy to see different sections of large flowcharts without scrolling, you can split the document window horizontally or vertically. The program automatically makes a backup of any file you open.



Sample Flowchart Flowcharts can contain any combination of text fonts, sizes, styles, and colors; lines; and object colors and patterns.

The only cumbersome procedure is binding a text string to a connecting line (associating the words *Yes* and *No* with the branches of a decision symbol, for example). If you type long strings of descriptive text, however, bound text doesn't disappear if you eliminate its connecting line. The text stays on the chart, so you can bind it to other lines or use it as free-form text.

FlowChart Express is an inexpensive, easy-to-use program that will readily meet the needs of most flowchart creators.
—STEVEN A. SCHWARTZ

Personal Information Manager

Hello

PROS: Inexpensive; easy to create mail merge documents. **CONS:** Documents must be linked to contacts; cannot set tabs or line spacing in word processor; occasionally quits without warning. **COMPANY:** Atelier Systems (415/285-1233). **REQUIRES:** Mac Plus; System 6.0.5. **LIST PRICE:** $99.

MW ★★

HELLO IS THE LATEST ENTRY IN A crowded field of utilities that track personal information like addresses and appointments. Instead of focusing on address-book and scheduling functions, though, Hello offers the unusual combination of contact management and word processing in a compact package. Unfortunately, this release has several notable deficiencies.

The Address Book module, Hello's strongest point, provides for each contact's name, title, company, address, voice and fax numbers, and E-mail accounts. Option-clicking on a field brings up a dialog box that lets you change the default field name. You can opt to have words capitalized as you type, and you can lock unused fields to prevent users from entering data in them. Hello doesn't automatically check for incorrect data as you type, though.

Buttons at the bottom of the window let you delete, duplicate, and enter new contacts; scroll through the Address Book; and dial telephone numbers through the Mac speaker or modem port. Hello ignores any area code you specify as local, and you can enter prefixes for outside lines and long-distance numbers. (The prefix fields should be larger to accommodate access numbers required by carriers like MCI and Sprint.)

The List View button switches you from the entry screen to a tabular format that shows each contact's name, company, address, and work number. If you're not satisfied with these field choices, you're out of luck—you can't control which fields show or how they're displayed. You can sort the list of contacts by one or two key fields, and you can search for entries that contain any specified text string. Like other contact managers, Hello lets you mark a subset of entries for later reference.

Hello's word processor, Typewriter, also suffers from a few limitations. For one thing, text documents that you create with it must be linked to specific contacts in the Address Book. This arrangement is designed to save keystrokes by automatically inserting contact information into memos and letters, but it's cumbersome if you want to write a document that has no related contacts. Even worse, if you delete a contact record by mistake, all its associated text documents vanish with it. Ouch!

The Typewriter module includes several unusual features—for example, you can insert Address Book fields into mail merge documents by choosing from a pop-up menu, and you can print envelopes with one mouse-click. It even has a spelling checker. But Typewriter lacks some features that Mac users expect; for example, you can change text attributes, but you can't alter the default tab stops or line spacing.

There are a few other problems. Typewriter uses Claris XTND filters to import and export files, but Atelier ships only the XTND translators for MacWrite and text files. Typewriter writes files to disk when you switch views, but I was also put off by Hello's lack of a file-save command. You should be able to save without exiting the document. And there are inconsistencies in the interface—for example, you change document titles by double-clicking, but it only takes one click to enter new field names in the Address Book. Finally, Hello sometimes quits without warning on my Mac IIci.

To be fair, Atelier plans to remedy many of these limitations soon, as well as provide additional plug-ins, including fax and calendar modules. I can't quite recommend this version, but I am eagerly awaiting the next release.—FRANKLIN N. TESSLER

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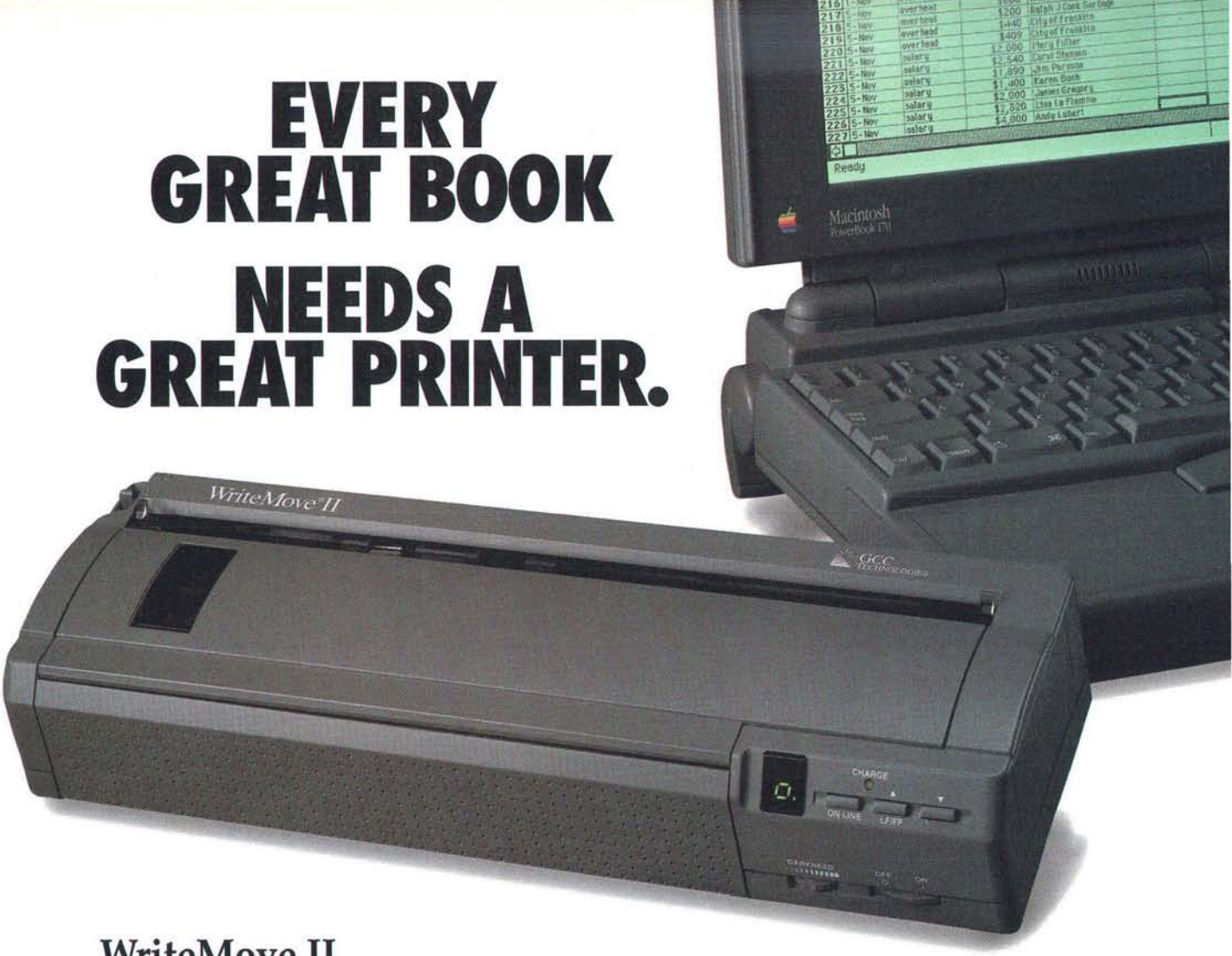

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Low-End Word Processor

LetterPerfect for Macintosh 2.1

PROS: Inexpensive; fully compatible with WordPerfect file format; intuitive column control; wraps text around graphics. **CONS:** Lacks style sheets; requires more hard drive space and RAM than WriteNow 3.0. **COMPANY:** WordPerfect Corporation (801/225-5000). **REQUIRES:** Mac Plus; hard drive; System 6.0.5. **LIST PRICE:** $149.

MW ★★★

DON'T BE CONFUSED BY THE VERsion number—2.1 is the first version of LetterPerfect released for the Macintosh. For the sake of consistency, WordPerfect matched the version number of LetterPerfect to that of WordPerfect for the Mac.

LetterPerfect is a stripped-down version of WordPerfect, available for a street price of a few dollars more than an upgrade from WordPerfect 2.0 to WordPerfect 2.1. While LetterPerfect has a few minor options not found in its more-robust sibling—including a split ruler that accommodates small screen sizes—it economizes in other areas, particularly in the page-layout department. LetterPerfect lacks borders or shading options, parallel columns, automated figure captions, independent text boxes, master pages, a drawing window, an index or table-of-contents generator, a sort feature, macros, or style sheets.

So what does LetterPerfect have? WordPerfect's intuitive column control, thesaurus and 125,000-word spelling checker, mail merge feature, ability to wrap text around graphics, support for System 7 features such as balloon help and publish and subscribe, and graphics-import capabilities.

That means that on its own, LetterPerfect measures up as a serviceable low-end word processor, adequate for users frustrated with the lethargic speed at which giants like WordPerfect and Microsoft Word run on Classics, LCs, and PowerBooks. While it sports WordPerfect's complicated code-based formatting architecture, LetterPerfect provides clean, accurate documentation and an uncluttered interface.

But LetterPerfect isn't the only low-end word processor. At least one competitor, WriteNow 3.0 from T/Maker, works on the Mac 512KE; LetterPerfect requires at least a Mac Plus. The WriteNow application consumes less than 300K on disk, so you can work from an 800K floppy; LetterPerfect consumes over 650K and requires a hard drive. WriteNow needs 490K of RAM; LetterPerfect, almost twice that. In return, WriteNow provides both character-based and paragraph-based style sheets, and Reference Software's Grammatik Mac grammar checker. LetterPerfect lacks all of these. Admittedly, LetterPerfect's graphics capabilities overwhelm WriteNow's, but in a low-end word processor, that's the least of my concerns. In the final analysis, WriteNow retails for $100 more than LetterPerfect and earns every penny of it.

However, if you're a WordPerfect user, LetterPerfect's stock rises dramatically. Say that you use WordPerfect at the office but tend to rely on a PowerBook at home or on the road. In that case, you'll appreciate LetterPerfect's ability to open any WordPerfect 2.1 document, regardless of its complexity. You won't be able to edit the document in many of the ways that you can in WordPerfect, but every formatting attribute will remain intact, down to the automated captions and indexing markers.

Like Nisus Compact, the condensed version of rival word processor Nisus from Paragon Concepts, LetterPerfect is a good value for a small subset of the folks who use WordPerfect. But neither Nisus Compact nor LetterPerfect can match WriteNow's readiness to strike out on its own. The last word processor to make this mistake, Microsoft Write, a reduced version of Word, dropped quietly into oblivion shortly after its introduction.—DEKE McCLELLAND

CD ROM for Learning Japanese

NihongoWare Volume 1

PROS: Exceptionally accurate guide to current Japanese business vocabulary and social customs. **CONS:** Small phrase set; Romaji only; expensive. **COMPANY:** Qualitas Trading Company (510/848-8080). **REQUIRES:** Mac Plus; 2MB of RAM; 4MB of RAM for System 7; CD ROM drive; System 6.0.4. **LIST PRICE:** $623.

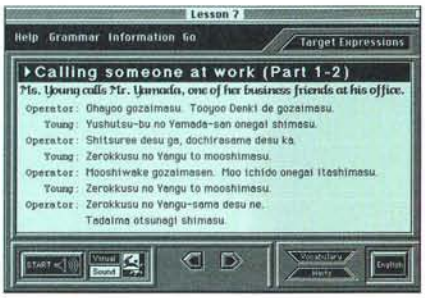
MW ★★

THE COMPUTER IN GENERAL AND the Mac in particular hold great educational promise, a large amount of it yet unrealized. With its foreign scripts, sound capabilities, and simple interface to CD ROM drives, the Mac seems to be positioned as a nearly ideal instructional tool, especially for languages. As hardware it's pretty close to ideal—the problem is first-class instructional material. Ariadne Language Link of Tokyo has prepared some first-class material for Xerox Japan, and it's now available as Volume 1 of NihongoWare (*Nihongo* means Japanese language), distributed here by Qualitas Trading.

To be blunt, it's wonderful stuff, but there isn't $623's worth of it on the CD (Volume 2 will be $665 and should be available by press time). The ten HyperCard-based lessons amount to a hypertext phrase book with digitized sound. The lessons cover trains, taxis, restaurants, directions, greetings, requests, business meetings, telephone usage, socializing after work, visiting at home, and shopping. Additional topics cover (in sound and pictures) business card etiquette, bowing, introductions, and what is appropriate for *you* to do in front of Japanese business associates in a karaoke bar. The Grammar menu covers topics likely to be less than obvious to English speakers, such as Japanese verb constructions, social conventions in address, and negation.

Ariadne/Qualitas has done something unique in this material, which is to offer the real goods. With the exception of the business-Japanese course developed for Nissan, most other textbooks, tapes, and videos give you slightly stilted or slightly out-of-date expressions. After two years of university Japanese with standard textbooks, you would find yourself, when ordering sushi in Tokyo, in roughly the same place as an American tourist trying out high-school French on native Parisians in a Left Bank café—we're talking geek city.

So NihongoWare has probably enabled hundreds of Xerox employees to speak modest amounts of real colloquial Japanese—the problem is that the quantity of digitized sound and cartoons on the CD ROM gives you the equivalent of a mere 20 pages of phrase-book material. For a company that regularly sends employees on short trips to Japan, NihongoWare Volume 1 represents a worthwhile investment—the training is in solid, if limited, Japanese conversation. For an individual, the economics are much less favorable; for the price of this CD ROM you could take small-group lessons every week for a year, and the instructor might even help you learn to read hiragana and a bit of kanji as well. If Ariadne's pioneering product line expands and the prices come down, though, we may yet see the Mac become an important Japanese-teaching device.—CHARLES SEITER



Say What? NihongoWare gets high marks for realistic usage in Japanese-language business conversation. The HyperCard buttons let you turn sound off and on, see cartoon characters and settings, and see English phrases or explanations of terms.

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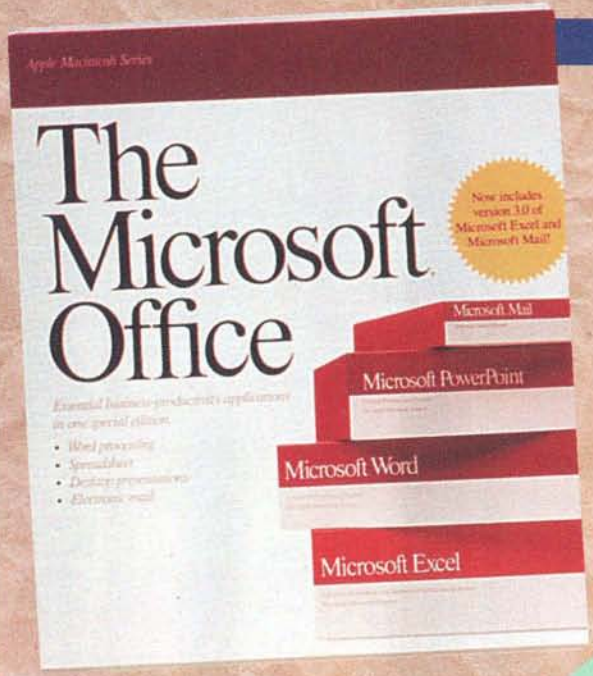

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- Group related files and save them in a single project file using Workbooks
- Use Autofill to automatically complete trends in your data entries. For example, if you've already entered Q1 and Q2, just select additional cells and Microsoft Excel intelligently fills in Q3 and Q4
- Walk through complex tasks in fewer steps than usual with the Wizards online assistants

Microsoft Word Version 5.0:

The word processor that makes everyday tasks easy.

- Easier-than-ever on-screen controls help beginners get started fast and help experts make everyday tasks a breeze
- Use the Ribbon to change type styles and size, formats, columns and more—all with a single mouse click
- More help for everyday tasks: integrated grammar and spelling checkers expanded Find File commands, file linking and automatic creation of indexes and tables of contents
- Let the Print Merge Helper guide you, step-by-step, through even the most complex merges
- Get Great-looking documents with drawing tools, shading and borders, tables, graphics handling and page preview
- Drag and Drop lets you rearrange text, graphics and page layout exactly as you want

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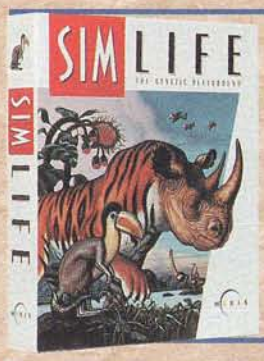
Flight Simulator 4.0 — $39

Take off and land at any of the major airports in the world. Flight Simulator boasts state-of-the-art, three-dimensional graphics and runs on both color and b&w Macintosh computers. Microsoft #04293



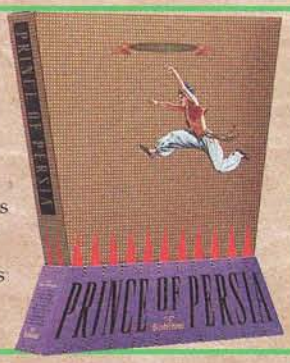
SimLife — $38

CONTROL THE FORCES OF NATURE!

SimLife is an advanced genetic simulation that allows you to design plants and animals from the genetic level to influence how they look, act and eventually evolve. Maxis Software #06109

Prince of Persia — $31

You have won the heart of the Sultan's lovely daughter. And in doing so you have unwittingly made a powerful enemy. Your country and the princess rest all of their hopes on you. Brøderbund #05649



Spectre — $38

Fly your own customizable high-tech tank and fight Enemy Robot Craft! Three-D graphics and digitized sound keep you on the edge of your seat. It's networkable so 6 can play on a single network! Velocity Development # 04816

MouseStick II Joystick ADB — $68

It's tough to beat Advanced Gravis' high-scoring MouseStick. Its advanced optical technology and processing unit are ideal for all your mouse-operated entertainment software. Advanced Gravis #05998 ✓

- Precision construction
- Smooth operation
- Ergonomic, high-scoring design
- Customizable settings

Hellcats Over the Pacific — $38

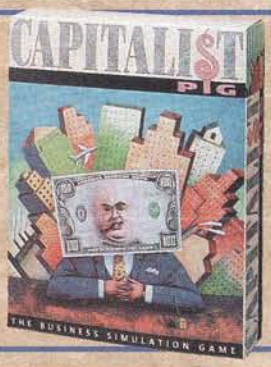
Jump into the cockpit of an F6F Hellcat and rule the skies over Pacific islands in a half-million square mile world. This exciting WWII flight simulator provides fast and fluid graphics, 256 colors and high-quality sound. Graphic Simulations #01046

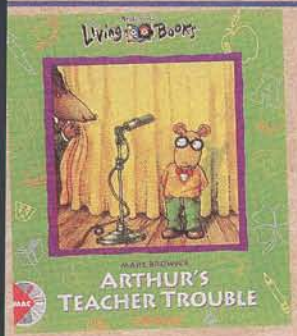
Full Metal Mac — $26

Full Metal Mac gets down to the nitty-gritty of modern warfare on a personal level. Your best laid plans often go to hell under the pressure of an intese fire fight. Watch out! Your left flank is being overrun. You have precious seconds to make your decisions. Hit the dirt! Incoming! SoftWars #06046

Capitalist Pig — $34

Run your own business and face the challenge of scandals, fires, terrorists and more, as you battle for billions or bankruptcy. You'll make crucial business decisions every minute and enjoy the results—or suffer the consequences. Pluma Software #05607





Arthur's Teacher Trouble CD-ROM — $44

This "living book" features lively animations, original music, realistic sounds and hundreds of words written, spoken and even spelled out loud! Based on the best-selling book by Marc Brown. Brøderbund #06108

Mac Kids Christmas Pack — $24

Nordic Software presents Christmas Pack, a diverse assortment of games and puzzles charged with holiday cheer! You'll find word games, picture puzzles, memory games and other activities. Simple enough to play right away. Great fun for friends and family during the holiday season. Nordic Software, Inc. #05637

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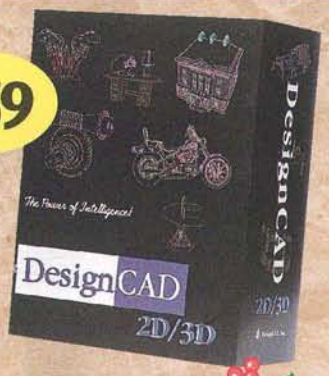


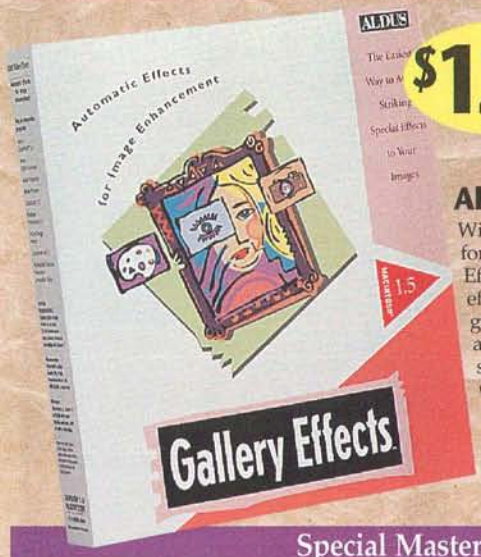
$159

DesignCAD 2D/3D

DesignCAD is a revolutionary and professional computer-aided design and drafting package that provides complete 2D drafting and 3D modeling in one package. It's designed for engineering (mechanical, architectural & electrical), animation, desktop publishing and multimedia. DesignCAD, Inc. **#04180** ✔

• **DesignCAD is easy to use!**

Tests prove that DesignCAD's user-friendly interface allows you to quickly produce professional drawings in a fraction of the time many competing products require. The flexibility and power found within DesignCAD means you save time and money! DesignCAD is truly the CAD system that anyone can use.



$128

Do Spectacular Graphics Effects on Your Mac

Aldus Gallery Effects

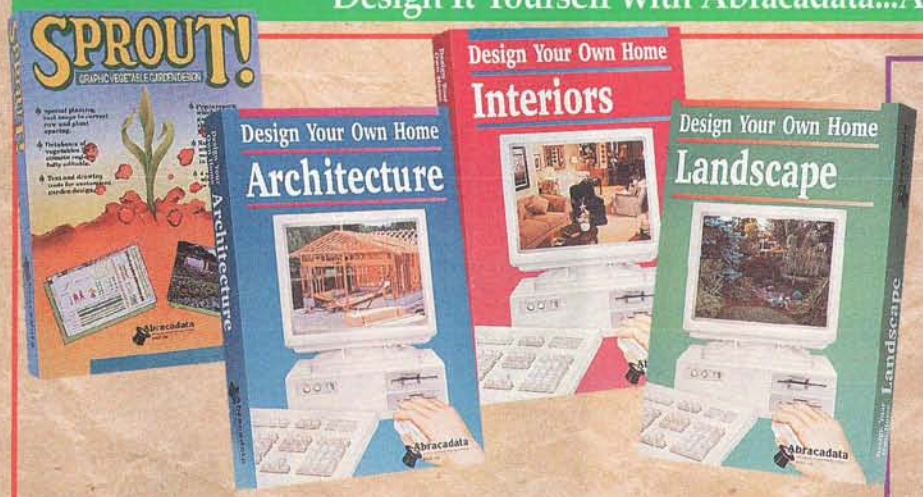
Winner of MacUser's MacEddy Award for Best Visual Resource, Aldus Gallery Effects is a unique library of artistic effects that automatically turns grayscale or color scanned photographs and other bitmapped images into spectacular, breathtaking works of art. Gallery Effects is a "must have" for anyone using a scanner or doing desktop publishing, graphic design or presentations. Sixteen "master effects" are included:

Special Master Effects

★ Graphic Pen	★ Mosaic	★ Poster Edges
★ Watercolor	★ Craquelure	★ Smudge Stick
★ Charcoal	★ Spatter	★ Film Grain
★ Dark Strokes	★ Chrome	★ Ripple
★ Fresco	★ Dry Brush	★ Chalk & Charcoal

And there are thousands of variations from each master effect! Each of the sixteen master effects has individual controls to let you customize the effect. For example, the Watercolor effect has controls to adjust the brush detail, the shadow intensity and the texture level. You can also apply multiple effects to a single image—the possibilities are endless. Aldus **#04121**

Design It Yourself with Abracadata...And Save!



Design Your Own Home

Whether you are a professional or a do-it-yourselfer, Design Your Own Home can make your planning time more productive.

Each program includes sample plans and a try-out section to get you started, plus command cards to keep by your side as you work. There are 4 programs: **Architecture** (floor plans to structural details), **Interiors** (furnishings to color schemes), **Landscapes** (trees to fences) and **Sprout!** (design your own vegetable garden). Includes several sample plans. Abracadata ✔

#03609 **Architecture**	$58
#03611 **Interiors**	$58
#03610 **Landscape**	$58
#05085 **Sprout!**	$42

$26

Mighty Draw

Mighty Draw is the affordable, general purpose, object oriented drawing program that allows you to create pie charts, column charts, bar charts, flow charts, organizational charts, graphs, electronic schematics, network diagrams, flyers, news letters, greeting cards, advertisements, logos, clip art and much more. Mighty Draw comes with symbols for flow charts, electrical schematics and more. You can even add virtually any symbol from any other program through the clipboard, including color. Abracadata **#06162**

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Christmas List the Easy Way

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$98

Fractal Design Sketcher

Fractal Design Sketcher brings revolutionary natural-media and imaging technology to grayscale graphics for the first time. Sketcher faithfully duplicates the expressive line of a soft lead pencil on rough sketch paper or the luminous glow of oil paints that have been layered on fine-weave canvas.
Fractal Design **#06157**

$95

NEW PRODUCT

Morph

The hottest movie image effect of the '90s is now available on the Mac! Morph smoothly transforms one image into another, creating dazzling images and effects. Whether it's last year's car model turning into this year's, or changing a docile kitten into a ferocious tiger, this effect has astounded audiences all over the world. Morph is fast, easy-to-use, and fully compatible with QuickTime. Gryphon **#05925**

$112

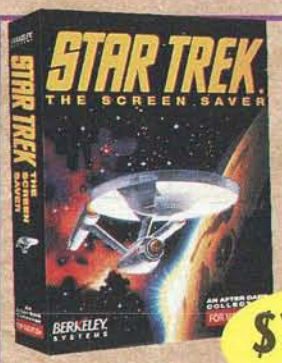
Smoothie

Smoothie removes the jagged edges from pictures in your drawing and presentation applications using true subpixel anti-aliasing for superior results. Smoothie also turns your presentation into a double-clickable application that contains all your slides and it builds QuickTime movies from any collection of individual pictures. The program uses Publish and Subscribe to tightly integrate with your drawing program and it works beautifully with TrueType & ATM fonts. Not intended for use with bitmap pictures from scanners or painting applications. Peirce Software **#06001**

$298

DrawingPad

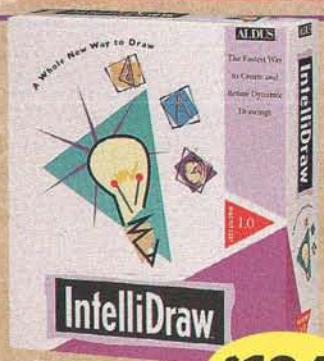
Improve the quality and productivity of your graphics with DrawingPad™, the unique drafting tool that combines the capabilities of a digitizer, a graphics tablet and a mouse. This low-cost, versatile, high-performance tablet is the perfect graphics solution for graphic design, illustration, desktop publishing, drawing, tracing, drafting, mapping, and other computer graphics applications. The pressure-sensitive pen and the tablet's surface (7.5" square) emulate traditional media feel, yet give you the full flexibility and power of the Mac operating environment.
CalComp **#05086** DrawingPad™ 7.5 x 7.5



$38

Star Trek: The Screen Saver

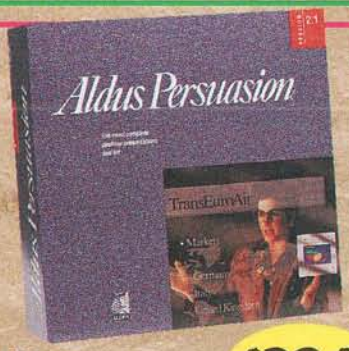
New from the makers of After Dark, one of our all-time best selling screen savers, comes Star Trek: The Screen Saver. It saves your monitor from phosphor burn-in with fantastic displays based on the original Star Trek series. Berkeley Systems **#05934**



$194

Aldus IntelliDraw

New from Aldus, IntelliDraw is an exciting new type of drawing program that gives you an easy new way to visually experiment, refine and draw your ideas. Full text and drawing options provide the flexibility you need. Aldus **#05481**



$324

Aldus Persuasion 2.1

Need to develop presentation graphics? Let Aldus Persuasion 2.1 do all the work. Just select one of the predefined templates (or create your own), and type your ideas into the outliner. Persuasion automatically prepares your slides from the outline. Aldus **#02424**

$274

Claris MacDraw Pro

If ease of use and precision results are your objectives, MacDraw Pro can help you get there. MacDraw Pro has many powerful features. Requires proof of ownership of a competing software product.
Claris **#04073** ✓

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$628

HitchHiker 80MB

HitchHiker offers all the capabilities of a standard external hard drive, yet fits in the palm of your hand. Weighing less than 10 ounces, each drive is shock-mounted in a compact, rugged case that measures only 5.4" x 2.9" x 1.1" (13.7 x 7.5 x 2.8 cm). But don't let the small size fool you. Featuring the latest 2.5-inch drive technology, HitchHiker gives you big drive performance and reliability. Just plug it into any Mac. It can be powered through the ADB port. Compact enough to carry in your shirt pocket, or in your briefcase along with your PowerBook. MASS Microsystems **#00971**

#00899 Hitch Hiker 40MB **$388**

#05936 Hitch Hiker 120MB **$748**

$598

DiamondDrive 120

Offering high capacity and high performance at an affordable price, the DiamondDrive 120 boasts access times as low as 12ms. It comes with software that provides easy-to-use formatting, volume partitioning and test diagnostics. All DiamondDrives are Preformatted, and covered with a two-year warranty and a Toll -free support line. MASS Microsystems **#04612**

$1598

DataPak MO/128 Rewritable Optical Drive

Because optical discs use a laser beam to read and write data, they do not wear out, and are not vulnerable to head crashes. This makes them much safer than magnetic hard disks, so they're great for archiving valuable data. And the cartridges are interchangeable, so you can add extra capacity and transport large files. MASS Microsystems **#00332**

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NEW FROM NEC!

You won't find a better value in CD-ROM than the new CD Express bundle from NEC. This affordable doorway package to the exciting world of CD-ROM saves you literally hundreds of dollars off the individually priced items. The 10 CD-ROM software titles alone are worth the asking price! But you get much more. Along with the software titles you get: a quality MPC-compliant CD-ROM drive, self-amplified stereo speakers, Mac interface and 4 size C batteries—everything you need to go live with CD-ROM in one box!

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The CD Express Package Includes:

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- **MPC-compliant reader**
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- **650ms average access speed**
- **150Kb data transfer**
- **64k cache memory**
- **Battery pack available**
- **Excellent video playback capability**
- **Self-amplified stereo speakers**
- **XT/AT or Mac interface**
- **4 size C batteries**

10 CD-ROM software titles:

- **Software Toolworks World Atlas**
  This comprehensive atlas, almanac and world fact book provides fast access to over 240 full-color, fully detailed maps.
- **Lucas Film Games Favorites**
  The most challenging Lucasfilm and LucasArts games—on one CD!
- **Great Cities of the World Volume II**
  A multimedia tour of ten of the world's most exciting cities!
- **Best of the Bureau**
  A collection of works of literature and history, selected from the Bureau Development library.
- **Interactive Storytime**
  Three delightful children's stories that both entertain and enhance reading development and language skills.
- **Total Baseball**
  A fascinating in-depth history and complete statistics of the game of baseball, including player and team profiles, photos and audio recordings of many of the sport's finest moments.
- **The Family Doctor Home Medical Reference**
  A practical, extensive medical guide offering answers to nearly 1,500 commonly asked health questions.
- **And more.** NEC **#05849**

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PowerMerge

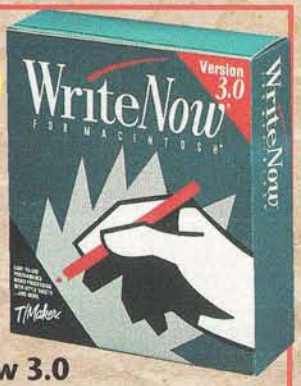
$86

PowerMerge solves the problem of keeping track of changes made to your files while working on your PowerBook. It simply and automatically synchronizes files between your PowerBook and your desktop Mac. It also features: notification if files have been changed on both computers since the last update, history log of updates, include/exclude by file.

- **Automatic reconciliation based on previously selected files, folders or disks**
- **Inclusion or exclusion of individual files, folders, disks or document types**
- **Disk locking**
- **Bidirectional updates**
- **Conflict notification if changes have been made to files on both computers before updating**
- **Background updates**
- **Balloon help, System 7 and more.**

Leader Technologies #05690

$148



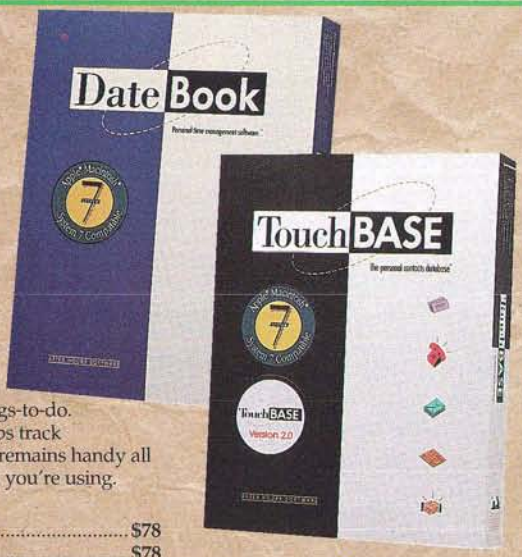
WriteNow 3.0

Who says a professional word processor has to be slow and complicated? WriteNow 3.0 is one of the fastest word processors available for the Mac and has long been considered by industry experts to be the easiest. A two-time winner of MacUser's Best New Word Processor Award, WriteNow includes a lightning-fast 135,000-word spelling checker, a complete thesaurus DA, the most powerful paragraph & character style sheets of any Mac word processor, a robust print preview, System 7 compatibility... and a lot more! Completely compatible with Microsoft Word, Works, MacWrite II, PC WordPerfect and other popular formats.

- ★ Awarded four stars by Macworld, 1992 (version 3.0)
- ★ Editors' Choice Award, Macworld, 1992 (version 3.0)
- ★ "Very Good Overall Value" (second highest), MacWEEK, June, 1992 (version 3.0)
- ★ Highest rating for Ease of Use, Speed, Value and Documentation, Government Computer News
- ★ Highest overall rating, Software Digest, 1990
- ★ Editors' Choice Award, Computer Reseller News, 1990
- ★ Editors' Choice Award, Best New Word Processor, MacUser, 1989

T/Maker #00641 ✓

$94



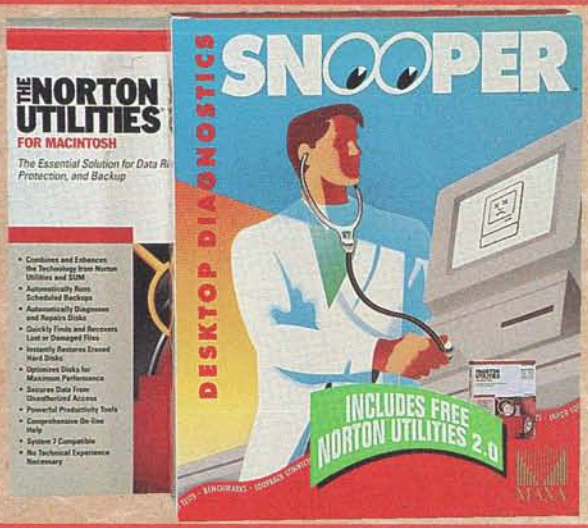
DateBook/ TouchBASE Bundle

Keep your professional life running smoothly with DateBook, the Macintosh personal organ-izer that enables you to enter and keep track of appointments, schedules and things-to-do. TouchBASE is a database which keeps track of personal and business contacts. It remains handy all the time--no matter what application you're using.

After Hours Software #06167

#05209 DateBook ✓ $78
#03908 TouchBASE ✓ $78

Diagnose the Problem Quickly and Easily with Snooper



$128

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SNOOPER

The next time you see a 'sad Mac' on your screen or your Mac's performance isn't up to par, diagnose from your desk with SNOOPER, the revolutionary new standard for Mac diagnostic and testing tools. SNOOPER performs a comprehensive suite of tests, checks all your hardware and identifies any problems. And the same SNOOPER software runs on all Macs. Until Dec. 31, 1992, buy SNOOPER and receive Norton Utilities FREE. Maxa Corporation

#05025 ✓ SNOOPER 1.0/Norton 2.0 Bundle $128
#05026 ✓ SNOOPER 1.0 w/NuBus Card/ Norton 2.0 Bundle $168

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Educational Physics Software

Caduceus Physics 1.0

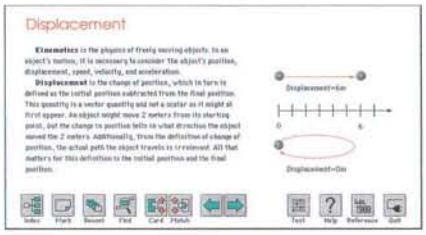
PROS: Thorough, well-written explanations of topics; online reference. **CONS:** Slow on standard Macs; limited use of advanced Mac possibilities. **COMPANY:** Scientia (617/776-3427). **REQUIRES:** Mac II; 13-inch monitor; hard drive. **LIST PRICE:** $159.95.

MW ★★★

MOST PEOPLE LOOK AT THIS SOFTware package and misread the name as Calculus Physics, probably thinking of the distinction between college physics for science and engineering majors (using calculus), and physics for everybody else (qualitative, no advanced math). Actually, this program is the everybody-else physics—it's called Caduceus Physics because it's the first in a series of programs to prepare people for the Medical College Admissions Test (MCAT) or other nationally administered tests. The people at Scientia assume you know that the caduceus is the staff with a pair of entwined snakes.

Caduceus Physics (CP) is a giant (nearly 8MB) HyperCard stack, consisting of carefully indexed cards covering small conceptual bites of physics. You can search the stack on specific topics and on multiple keywords, browse for topics in the well-organized tree index, or start at the top and go through the whole stack. Some cards feature basic illustrations, and some add little bits of animation to the illustrations.

As a teaching device, this product has two great strengths. First, the writing is uniformly high-quality—on a par with the best available undergraduate texts (alarmingly similar to some of them in places, in fact). Second, CP is an efficient preparation for tests; there's no physics-for-art-majors stuff and no material that's too advanced to appear on a test in a standard U.S. college freshman physics course. There are, however, a few problems. Since CP is a big HyperCard stack, it's sluggish on anything less than a IIci. The illustrations are the same old diagrams you'd see in any text, and the animations are often uninspired or even unnecessary (vector multiplication, for example). The question-and-answer capability isn't interactive—in response to a test question, you just make your guess and then get to see the right answer.



Five-Card Draw This card is linked to a card that tests you on the concept, to cards that contain reference materials, and to cards on related topics. Topics with more kinetic possibilities have icons for minimalist movies.

The oddest design limitation, though, is in supported hardware. The millions of Mac Classics in America's schools can't run this program, nor can Macs with Apple's 12-inch color monitor, found atop the IIsi and LC. The latter is most annoying because the program doesn't make particularly effective use of color, and the screen typically contains lots of white space.

But Scientia is in the business of readying people for the MCAT, as its future offerings (chemistry, organic chemistry, biology) clearly indicate. On this level CP is the right tool for the job, and while it's not cheap by educational standards, it is a bargain compared with flunking the MCAT, and winding up digging potatoes instead of practicing medicine. If I wanted to turn a reluctant student on to physics, I'd recommend Interactive Physics II by Knowledge Revolution. If I wanted to improve the student's odds of passing a standardized test (or even freshman physics), I'd recommend Caduceus Physics in a minute.—CHARLES SEITER

Personal Record Keeper

Nolo's Personal RecordKeeper 3.0

PROS: Nice basic features; exports easily; helpful legal information in manual. **CONS:** Little flexibility; inadequate data manipulation; no import feature. **COMPANY:** Nolo Press (510/549-1976). **REQUIRES:** Mac Plus. **LIST PRICE:** $49.95.

MW ★★★

IT'S A DREADFUL TASK FOR THE mourner: sorting through a loved one's personal papers to discover that property records, financial matters, and insurance plans are disorganized and incomplete. Nolo Press, a publisher of legal software and books, knows what information the mourners will need, and has designed Nolo's Personal RecordKeeper (NPR) 3.0 to make that task a little easier.

With NPR, formerly called For the Record, you enter personal information into a database of 27 categories. The program is organized hierarchically: each category contains subcategories, and each subcategory contains entries. For example, the Sources of Current Income category's subcategories include Employment, Alimony, Royalties, and Worker's Compensation. You enter account numbers, payment schedules, and other vital information in subject fields.

NPR's interface is uncomplicated and straightforward; both the manual and the online help files are good. It's easy to learn, requires little memory, and runs well on a Mac Plus. But Nolo Press's informational materials succeed in helping the user much more than do the product's actual features.

Two problems make the potentially useful application significantly less valuable to the average consumer. First, while you can export NPR databases to word processors or spreadsheets, you can't import text from other applications. Your only option is to cut and paste with the Clipboard or Scrapbook, a frustrating and laborious task.

Second, with a few exceptions, you can't add, remove, or change the names of categories, subcategories, or subject fields. For example, there's space for information about your boat alarm, patent, and airplane hangar, but you can't add a place to note charitable donations or computer serial numbers. If NPR lacks a category or subcategory you want, you have to enter information into ambiguous "other" subcategories or in individual notes files. This is especially egregious given the highly specialized categories. It's as if the program was designed with a particular user or socioeconomic group in mind, and many people probably don't belong to that group.

Another problem with NPR is its security system. You can lock a database or a category, but not a subcategory. Also, you can only use one password per file. This means everyone with a password can access all your information, a situation I'd rather avoid.

One of NPR's nice features is its ability to evaluate your data and create Home Inventory and Net Worth reports. While the reports are good, you can't edit them; you need to return to the entry field in question to change the value.

Nolo's manual is well organized and quite helpful; it contains a useful legal guide to maintaining family records and financial affairs, even though the manual points the reader to Nolo Press books too often. Nolo's free tech-support line (a toll call) is open Monday through Friday, 9 a.m. to 5 p.m. Pacific time. When I called, the tech-support staffer had to consult other people to answer my questions.

Do you need NPR 3.0? If you need to organize lots of information into numerous categories and subcategories, if you don't mind typing in data, and if you want the sound legal advice provided in the manual, NPR might be for you. And hey, if you're keeping track of your boat and vacation home, you can probably afford the $49.95. —JOANNA PEARLSTEIN

Router

PathFinder

PROS: Inexpensive; easy setup; great tech support. **CONS:** Not easy to configure when used as part of a large internet. **COMPANY:** Dayna Communications (801/531-0600). **LIST PRICE:** $899.

MW ★★★★

FOR ANYONE ADDING ETHERNET CAPABILITIES to an existing LocalTalk network, the shopping list and associated price tags can add up quickly. Often you'll also need to include the expense of a networking consultant. Dayna has taken some of the sting out of this cost crunch by producing a LocalTalk-to-Ethernet router at an attractive price. Also, configuring the router is a breeze—just plug and play, for a simple Ethernet-to-LocalTalk network. Configuring the router becomes a little trickier and requires some network know-how when it's added to a large multirouter internet.

For the formation of a simple internet (a LocalTalk network and an Ethernet network connected by one router) the PathFinder comes ready to use right out of the box. The only configuration required is to connect the networks to the PathFinder. This involves plugging the LocalTalk network into the standard LocalTalk DIN-8 connector port and patching the Ethernet hub into the other port using one of three cabling systems: RJ45, AUI, or BNC. This process took me less than five minutes and provided immediate access to and from devices on either network. The PathFinder automatically generates two default zone names and network numbers. No software configuration is necessary. This is a great breakthrough for nontechies who have been intimidated by the complicated setup required for higher-priced routers.

The PathFinder can also be used to extend an existing Ethernet zone over a single LocalTalk network, provided that there is no other router on the LocalTalk network and that you don't want to change the Ethernet zone name over the LocalTalk net. This provides transparent access to all devices on either network without the hassle of zone switching for the end user. A toggle switch on the back of the PathFinder makes this possible—again, no software configuration is required.

The PathFinder can also be used in a multirouter internet. For this, you need some networking expertise, since the documentation is sparse and software configuration is necessary. Using the PathFinder Setup Utility, you must indicate whether you want the router to be a seed router (seed routers transmit routing information over the network, nonseed routers absorb routing information from other routers on the network) and which phase of EtherTalk (Phase 1 or 2) you're running on the rest of the internet. You must also designate the zone name and network number or range of numbers the PathFinder will be using. If you don't know much about AppleTalk networking, the manual refers you to the book *Planning and Managing AppleTalk Networks* by Apple Computer (Addison-Wesley Publishing Company, 1991). According to Dayna's tech support, there's no detailed configuration information in the manual because internet complexity can vary greatly.

But don't worry if you need a little hand-holding through the installation. The tech-support reps I spoke with were knowledgeable, courteous, and patient. They even provided additional information on network numbers that was unclear in the manual and verified that I had correctly configured the router for my particular internet.

So what's missing? The PathFinder is a single-protocol router (AppleTalk). If you need to tangle with other protocols such as TCP/IP or IPX, you're better off using the higher-priced alternatives that provide protocol translation. The PathFinder is a great value for the dawning internet and a great timesaver for the beginning network manager or MIS guru.—MATTHEW R. CLARK

Printing Extension

WonderPrint 1.0

PROS: Speeds output of pictures on PostScript printers; improves output of graphics on QuickDraw printers. **CONS:** Doesn't improve output on color printers; some programs can't take advantage of WonderPrint. **COMPANY:** Delta Tao Software (408/730-9336). **REQUIRES:** Mac Plus; any black-and-white printer; System 6.0.5. **LIST PRICE:** $59

MW ★★★

PRINTING PICT AND TIFF HALFTONE images with the Mac used to require patience and an expensive printer. WonderPrint is a printing extension that speeds and improves the graphics output from QuickDraw printers like Apple's StyleWriter and Hewlett-Packard's DeskWriter. WonderPrint also speeds up color-image printing to black-and-white PostScript printers like Apple's LaserWriter Plus and IIf. WonderPrint doesn't accelerate text-document printing, nor does it improve the printing of line art or text on color printers.

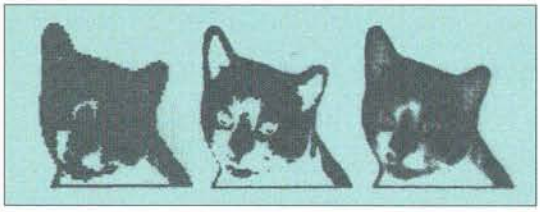
To install WonderPrint, you simply drag its icon to the System Folder. The manual says, "Once you install WonderPrint, you can pretty much forget about it." The manual is right. After you install WonderPrint, the print dialog box gives you additional option boxes—a check box turns WonderPrint on and off, and radio buttons indicate if graphics are to be dithered or printed as halftones.

WonderPrint doesn't improve the quality of images printed on PostScript laser printers, but it does increase the print speed. Printing a 145K color PICT image on a LaserWriter IIf took 163 seconds without WonderPrint and 70 seconds with it. On a LaserWriter Plus, a 1.5MB color PICT file printed in approximately 2 minutes with WonderPrint versus 20 minutes without.

Some applications, Photoshop for example, bypass the standard print drivers. They also bypass WonderPrint. Delta Tao doesn't provide a list of applications that bypass the driver, but it does include a separate application, WonderPict Printer, that opens PICT files and lets them be printed through WonderPrint. To improve color printing, Delta Tao recommends using a paint program that supports the ImageWriter, such as Delta Tao's own Color MacCheese or Microspot's MacPalette II.

Delta Tao provided excellent tech support. My questions were answered patiently and correctly. When I left a message, my call was returned within an hour.

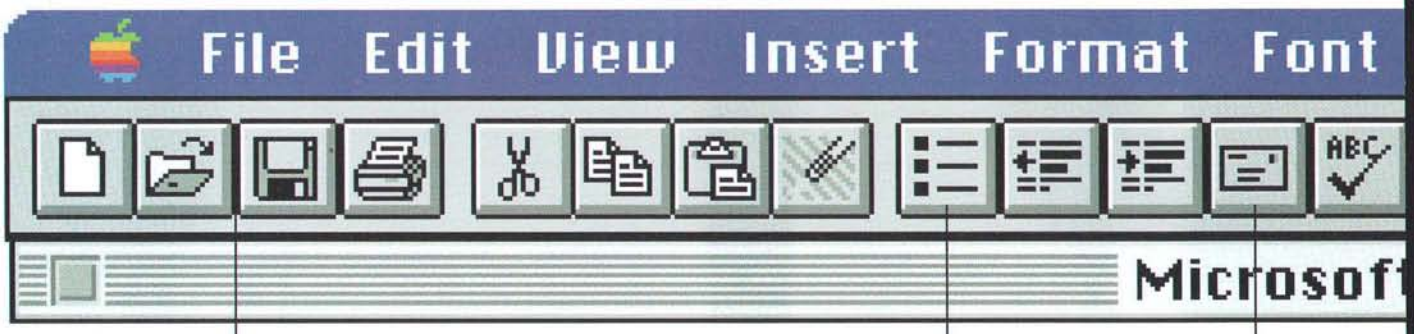
A rule of thumb: The cheaper your printer, the more you benefit from WonderPrint. A PostScript laser printer with WonderPrint prints graphics faster, but the output's quality remains the same. A QuickDraw laser printer with WonderPrint prints graphics with quality equal to that of a standard 300-dpi PostScript laser printer, but speed isn't improved. StyleWriters and DeskWriters with WonderPrint become a cheap means of producing halftones good enough for newsletters.



Wonder Kitty With WonderPrint and a StyleWriter, I printed the detailed image on the right in the same amount of time it took to print the mostly useless image on the left.

Those who would benefit the most from WonderPrint are owners of ink-jet QuickDraw printers such as the StyleWriter and DeskWriter. The reason many of us bought these printers was that they promised near-laser-quality text output. WonderPrint adds halftone graphics printing as well.—JIM FEELEY

Take a short



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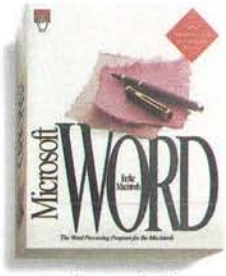

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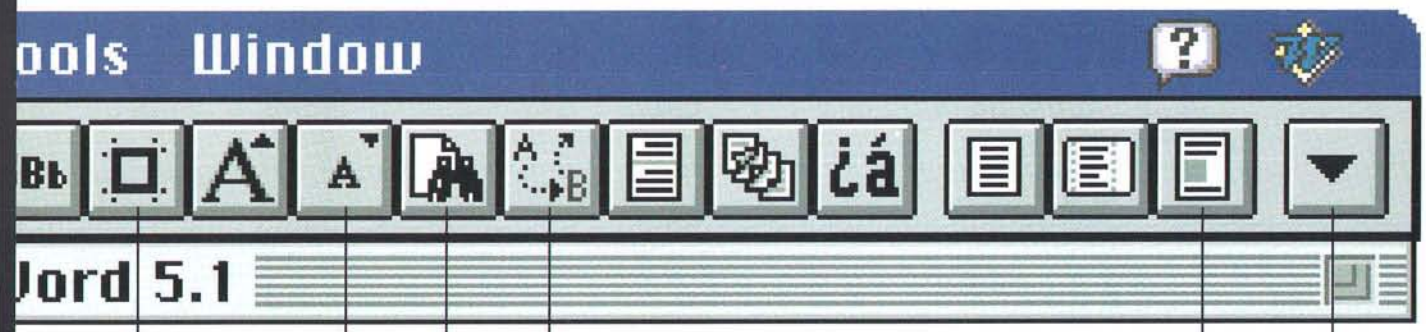
cut to work.



Shortcut to borders. Frame your ideas in a variety of ways.

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Microsoft Word 5.1 comes with special installation features and a new battery indicator for the Mac® PowerBook.™ It also has QuickTime™ support, which allows you to add full-motion video as easily as inserting a simple graphic.

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Sharp Wizard Data-Transfer Program

Organizer Link II

PROS: Merges Mac and Wizard data; tags records; prints reports; exports and imports ASCII and tab-delimited text files. **CONS:** Business Card data transfers are slow; no search-and-replace function; no defaults for empty date or time fields; plain-text reports. **COMPANY:** Sharp Electronics Corporation (800/321-8877). **REQUIRES:** Mac Plus; hard drive; System 6.0.2. **LIST PRICE:** $129.99.

MW ★★★

A 5000-, 7000-, OR 8000-SERIES SHARP Wizard can now talk to a Mac. The Organizer Link II (OL2) program and cable enable you to hook the Wizard to one of the Mac's serial ports and exchange data.

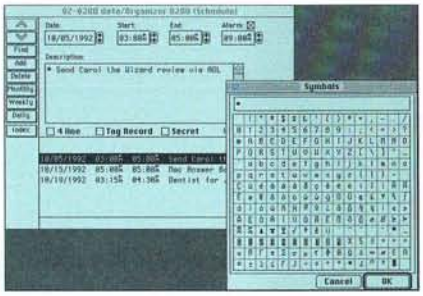
The Wizard is incapable of handling merges, so all data sent to the Wizard is appended to the end of the current file or replaces all data in the file. The OL2 software, however, can perform a merge and ignore duplicate records. If an assistant updates your appointments and telephone databases on a Mac equipped with OL2 while you're making your changes on the Wizard, it's easy to merge the databases. Just upload the Wizard data to the Mac and instruct OL2 to merge the information. Then download the revised data files back to the Wizard, overwriting the original files.

Transfers in either direction move along at 9600 bps. Transfers bog down only when moving data from the Business Card database. All other Wizard applications store their data as simple text files. The Business Card application, however, maintains an index file with pointers to linked records. That's how it can store multiple records without forcing you to reenter the address information each time. In a Business Card transfer, each record must be rebuilt and the pointers updated while the transfer is occurring. To transfer 300 such records takes about 20 minutes; transferring the same number of records for one of the three Tel (telephone) databases takes only about a minute. Therefore, if you will be updating telephone or contact information on both the Wizard and the Mac, you'll be happier working with one of the Tel databases than with the Business Card database.

OL2 also has importing and exporting capabilities. However, since you cannot select specific fields to be imported or exported nor the order in which fields appear, you may need to use a spreadsheet or database program to reorganize the information before moving address-book data to the Wizard. You can tag individual records or groups of records.

OL2's weaknesses are minor. A replace function would be helpful in handling the differences between the Mac and Wizard character sets. The reports are unattractive and cannot be customized beyond specifying date ranges or a record subset. Finally, new date fields don't provide a default date; they're initially empty. A time-stamp function can be used to enter the current time.

OL2 makes it easy to transfer data between the Wizard and the Mac—which, after all, is its main purpose. Owners of the original Organizer Link can upgrade to OL2 for $39.95.—STEVEN A. SCHWARTZ



Symbols List To maintain character compatibility, OL2 provides a pop-up Symbols list. To enter a Wizard symbol into a Mac record, you copy the character to the Clipboard, and then paste it into the record. Although option-8 produces a bullet symbol on the Mac, you must use the Symbols list to select the Wizard-compatible bullet.

Type-Specimen Generator

Spectacular 1.2

PROS: Variety of templates. **CONS:** Can't edit sample text size or leading. **COMPANY:** FontHaus (203/846-3087). **REQUIRES:** Mac Plus; hard drive; PostScript or QuickDraw printer; System 6.0. **LIST PRICE:** $79.95.

MW ★★★★

LET'S SEE NOW, I HAVE AROUND 5000 fonts in my collection, and sometimes I have several hundred installed at a time. (I'm counting each style and weight in a family as a separate font, mind you, but any way you cut it, I have a lot of fonts.) Whenever I embark on a new publishing project, I like to print out type samples to see which fonts are right for the job. The task of printing specimen sheets is greatly simplified with Spectacular, developed by Omega Systems and distributed by FontHaus.

Although you can create your own spec-sheet template in a page-layout program, you still have to apply a font to each spec sheet you want to print. Spectacular automates the job, allowing you to select several fonts and choose the Print command just once to print the whole batch.

You're confined to Spectacular's selection of templates, but the program offers seven formats, so you'll probably be able to find one that suits you. My favorite is the "Efgx" layout, which shows a large sample of those letters on a background of hairline rules to help you look at the size of ascenders, descenders, and so on. This layout also displays the font's basic characters—letters, numbers, and common symbols—as well as a copyfitting chart that gives the average characters per pica. An optional second page shows a text sample in a variety of sizes and leadings; you can type your own sample text if you wish. Other layouts offer variations on this theme; some show all the characters in a font, including mathematical symbols, accented letters, and so on. Other templates print a keyboard layout, a list of all installed fonts (printed in each font's typeface), and a pica ruler and protractor that you can print on transparent film.

Spectacular works with all installed PostScript, TrueType, or bitmap fonts. (A handy option lets you exclude bitmaps if you want to print samples of outline fonts only.) The fonts can be installed in the System Folder, or accessed with a font-management utility like Fifth Generation Systems' Suitcase. You can either press a button to print samples of all your fonts, or select the fonts you want to print from a scrolling list. The program is smart enough to treat a four-style family (regular, bold, italic, and bold italic) as a unit, and it lets you print samples of all the styles on a single page if you choose.

Spectacular offers several nice touches that you won't find in Agfa's similar program, TypeChart ($99). For example, Spectacular provides more template options, offers Exclude Bitmap and Select All commands, correctly prints the names of all-cap fonts in its font list (whereas TypeChart prints just the first letter), and has a space-saving two-column format for its font list. TypeChart does have a few pluses of its own, however, including on-screen previews of templates, a check for font-ID conflicts, and more size and leading examples on its text-sample page.

Spectacular is a useful program, but there's a public-domain spec-sheet program called theTypeBook, by Jim Lewis, that has it beat in one respect: theTypeBook lets you customize the point size and leading of its sample text blocks. (On the other hand, theTypeBook offers only two template pages and comes with somewhat obtuse documentation. Still, you can't beat the price.)

If you run a typesetting service bureau, offer Macintosh-based design and layout services, or simply own a large font collection, Spectacular can help you keep track of your fonts efficiently and attractively.
—ERFERT FENTON

And here's an upgrade you can't bypass.

New Microsoft® Word 5.1 for the Macintosh®. This new upgrade has such great shortcuts to work, that taking it home should be easier, too.

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Voice Recognition for the Mac

Voice Navigator SW 2.3

PROS: Headset mike included; no extra hardware needed; includes command sets for many applications. **CONS:** Doesn't really understand speech. **COMPANY:** Articulate Systems (617/935-5656). **REQUIRES:** Mac with sound input; 2MB of RAM; hard drive. **LIST PRICE:** $399.

MW ★★★

IF YOU REALLY WANT TO WOW YOUR friends, voice control is the way to go. And if your Mac has built-in sound input, Voice Navigator SW is the easiest way to add speech recognition to your system. (If your Mac came with a microphone, it's probably compatible. For other Macs, Articulate Systems sells Voice Navigator II, which includes a separate digitizer.)

Voice Navigator uses sounds to activate macros—sequences of basic actions, such as typing text, clicking, and dragging. Setting up an application for voice operation is a two-stage process: first, you choose the functions that you want to control by speech; then you assign the sounds that you'll use to activate them.

The first step should be familiar to anyone who has used a macro utility like CE Software's QuicKeys. Voice Navigator's macro software takes the form of a DA called Language Maker, which, though harder to use than QuicKeys, lets you create macros for almost any operation, from selecting tools on floating palettes to checking off items in dialog boxes. (Certain macro functions require special modules called Voice Extensions that come with Voice Navigator. One even lets you execute QuicKeys macros by name.) If your main goal is to control menus by voice, Language Maker lets you create macros for all menu items in an application.

Voice Navigator macros are nested in a way that mimics the way most Mac applications work, although you can use the Language Maker DA to reorder commands. Defining a complete set of macros for a program can be challenging; fortunately, Voice Navigator ships with predefined macro files for many popular applications.

The second step in using Voice Navigator is to assign spoken words to the macros you've created. Actually, any distinct, reproducible sounds will do—I trained Voice Navigator to shut down the Mac when I clap my hands, just like the lady in that annoying TV commercial. The process of assigning voice commands must be repeated for every user, to account for differences in inflection, pitch, and so on. Voice Navigator stores each person's voice patterns in a separate file, so it's easy to accommodate new users by having them perform their own voice-training sessions. To train a command, you repeat it three times in response to prompts from the Voice Navigator software. The process is sometimes frustrating, but the manual offers a number of helpful suggestions. The more distinctive one voice command is from another, the better the result.

The microphone you use also affects voice recognition. Both the Voice Navigator's own headset mike and the small hand-held unit that comes with the Mac work well, although the headset mike is more convenient because it keeps your hands free. I tested Voice Navigator under a variety of conditions ranging from relative silence to a din. As promised in the manual, the headset mike performed better than a hand-held mike at high ambient noise levels because of its noise-canceling properties.

It's hard not to be tempted by speech recognition, especially if you grew up watching the computer on "Star Trek" perform Mr. Spock's bidding. Although Voice Navigator doesn't really comprehend what you're saying, if you understand its limitations, it can be a real boon for disabled people and others who need to minimize interaction with the keyboard and mouse.

—FRANKLIN N. TESSLER

Financial-Management Program

Managing Your Money 5.0

PROS: Feature laden; more than 40 types of reports; excellent price; tax data can be used by Tax-Cut. **CONS:** No notification of reminders. **COMPANY:** MECA Software (203/256-5000). **REQUIRES:** Mac Plus; hard drive; System 6.0.2; modem for CheckFree option. Recommended: 2MB of RAM. **LIST PRICE:** $79.95.

MW ★★★★

MANAGING YOUR MONEY 5.0 (MYM) is an everything-but-the-kitchen-sink financial program for families and for owners of small businesses. Version 5.0 introduces several enhancements, including passwords; the ability to import data from Intuit's Quicken; additional sort and search functions in check and transaction registers; and one-button distribution of investment interest and dividends.

MYM has five components: Remind (appointments and reminders), Money (check-writing and budgeting), Tax (displays IRS schedules that show your taxable expenditures and income to-date), Invest (portfolio and investment management), and Plan (insurance and retirement planning, loan analysis, and other financial calculations). You can navigate by menu items or HyperCard-style buttons.

Before you begin entering data, you must establish a chart of accounts (assets and liabilities) and budget categories. MYM includes two sets of sample accounts and categories: one for individuals and one for small businesses. You can use MYM's categories or create your own. Categories can be added or edited as you enter transactions.

You can associate any budget item with a specific IRS line item. Taxable interest, for example, can be assigned to Schedule B interest income. Still, MYM isn't tax-preparation software. TaxCut, a new tax package being developed by MECA Software, will be able to import MYM tax-related data.

MYM lets you set any of the five windows to automatically display at the start of each session. Reminders, however, don't actually notify you of pending events. It's up to you to notice and read them. The only other significant problem is that it's easy to allocate an expense to the wrong account—especially if you have multiple savings, money market, and checking accounts. I'd advise you to examine the check and transaction registers to see that everything ended up where you intended.

Getting the maximum benefit from MYM (or almost any other financial-management program) requires buying special checks for your printer, or using CheckFree to pay your bills via modem. Otherwise, you have to draft the checks by hand and then enter the same data into the program. And two separate check registers (one electronic and one in your checkbook) means two performing reconciliations each month—and twice the opportunity for error.

Transfer Money Window Clicking on the appropriate symbol in the lower-left corner of this window displays the appropriate screens for entering a check (–), deposit (+), transfer (T), or recurring transaction (R).

Version 5.0 breaks no new ground, but this popular program is now more powerful and easier to use. With its ridiculously low price, Managing Your Money is something you should definitely check out if you're in the market for a full-featured financial-management program.

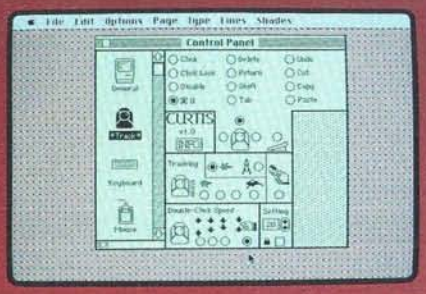
—STEVEN A. SCHWARTZ

This is not your average mouse...

ADB Version for Macintosh® SE/II.

Meet MVP Mouse™ from Curtis.

One look tells you, MVP Mouse is not just another trackball. Its ergonomic 3-button design responds to your every impulse as if it were an extension of your hand. Its 200 DPI resolution and automatic acceleration give you pin-point cursor control *plus* the ability to "jump" across the screen with just a short, quick movement of your fingers. And its powerful control panel lets you select preset tracking and double-click speeds . . . or create your own! And it gives you dozens of button functions to choose from, including a Custom Command that simulates any ⌘-(letter) keyboard command.



You can assign any command to any button, quickly and easily on-screen. Optional Foot Switch acts as 4th command button.

Actual size

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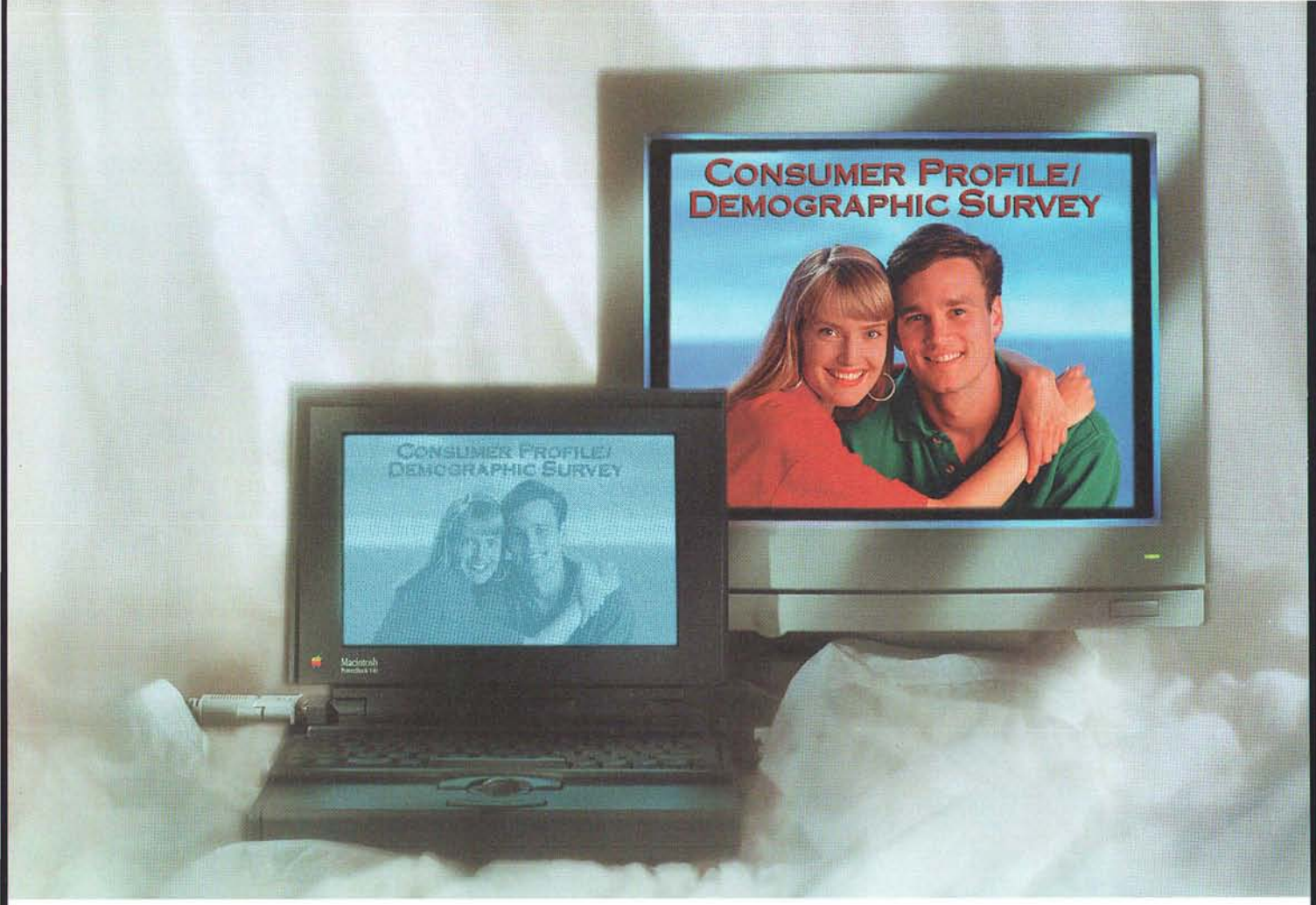
Circle 20 on reader service card



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With Envisio's new ColorBook 16, your PowerBook can display photographic quality images in brilliant 16-bit color! ColorBook 16 is the first internal display interface to deliver 32,000 colors on VGA or Apple compatible 12", 13", 15" or 16" monitors, or overhead projection devices. Your PowerBook can even display 256 colors on larger 19" or 21" monitors.

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Circle 204 on reader service card.

The Well-Filed Floppy

BY DAVID POGUE

I'VE HEARD VARIOUS REACTIONS to the heaps of floppy disks that adorn my cluttered office. One friend likened them to little plastic stalagmites growing from every horizontal surface. Another compared these stacks of blue and black plastic squares to 90-packs of American cheese singles about a year past their prime. To me, however, these disk mounds had become pure elbow hazard. One scramble for a phone call, and they would clatter to the floor like so many plastic potato chips. It was clear I needed some kind of system.

Fortunately, America's programmers have blessed us with a plethora of disk-cataloging programs. (Some bear the designation *shareware*, meaning not sold in any store; you get them from a user group or a dial-up service like America Online. As always, contact info is listed in *Where to Buy* later in this issue. And nope, I didn't forget Cataloger; it's in midoverhaul by Masters Publishing.)

I was awed by the apparent avalanche of answers. I thought: "Disk-cataloging programs—heck, that's for me! I'm sure even the lamest one lets me feed it floppy disks, look through my disks in a window, and print labels for the ones I want."

Boy, was I wrong.

DiskTrivia 1.1

THIS FREEWARE HYPERCARD STACK BY Bradley Beaubien gobbles and scans 6 dpm (disks per minute). That's not mind-blowingly fast, but DiskTrivia's interface wouldn't threaten a baby. Hand the Mac a floppy, and DiskTrivia neatly types its contents onto the life-size on-screen disk's label. Iconic buttons along the edge let you find a file, sort the disks, or view a list of all your disks. There's a wealth of clever touches: DiskTrivia can automatically give each disk a number ("23 of 40"); you can change the font or size of anything (it's HyperCard, after all); and it has a blank where you can type in the name of the box in which you keep each disk.

Alas, DiskTrivia doesn't catalog hard drives or SyQuest cartridges—only floppies. And incredibly (given its interface), the thing doesn't print disk labels. Still, at $0.00, it's worth a download.

P.S. Just so you'll know that I did my homework, I also tested a raft of other HyperCard shareware disk-catalogers: Disk Finder, Disk Indices, DiskBank, Disk-it, and Disks 'R Us. All are home-made-looking and not fast or automatic enough for actual humans who have lives.

Disk Ranger 4.7.6

IF YOU SQUINT AT THE DENSELY LASER-printed, copier-setting-was-too-dark manual, you find out that Disk Ranger's feature set is impressive (Graham Software). It can instantly catalog all disks on your desktop, including hard drives, cartridges, networked servers, and (though it takes forever) CD ROMs. It comes with a desk accessory that finds files on your hard drive or among the disks you've cataloged. There's a system extension that eyes your floppy disk drive; if it spots a floppy it hasn't seen before, it adds the disk's contents to the catalog. The program prints disk labels (although you can't specify fonts, sizes, or formats). The program also has features for password-protecting files, compressing files, and editing files (à la MacTools).

With all those features, who could complain? I'll tell you who: anybody who wants to see a plain old list of disks, or view a hierarchical folder display, or spot duplicate files. The program's primary view shows a list of *files*, not of disks. You can sort the list, and the program can highlight files that match a search request, but the found files aren't listed consecutively. Worse, the display takes up two lines for each file, making it almost impossible to scan as you're looking for something.

DiskQuick 2.10

NOW *THIS* PROGRAM HAS the makings of a darned fine floppy-disk manager. It's fast. It's pretty. And it shows the contents of your disks in a beautifully formatted list window, in your choice of font.

Unfortunately, this baby's a prototype, as far as I'm concerned. Under System 7, it either leaves ghost floppy-disk icons all over the desktop after cataloging them, or else it trips itself up on the second disk and stops cataloging altogether. You can't export the lists of disks or files. And it doesn't print labels. I'm sure DiskQuick (Ideaform) has some other good points—but if cataloging disks and printing labels aren't among them, I'm not sure they're relevant.

Cat Back 2.1

THIS PROGRAM (ENTERPRISE SOFTWARE) is officially both a cataloger and a backup program (Cat Back, get it?). It catalogs disks so fast that my 12-per-minute rating is probably even a little low—each disk spits out of the drive almost before you're ready with the next one. It's fast at everything else, too—searching, sorting, selecting, and so on. And there are some wonderful cataloging features: the program slurps up hard drives, SyQuests, or individual folders, and the accompanying control panel automatically logs any new disks you insert during the course of your work.

Unfortunately, Cat Back, like Disk Ranger, is more about managing *files* than disks. Using the nicely organized menu commands, you can make the file list flip upside-down, turn inside-out, or stand on its head—but you can't see a simple list of your disks, let alone a hierarchical display of their contents. I have misgivings, too, about including a Shut Down command within the program—and particularly about its location at the bottom of the File menu, where Quit is supposed to be.

Although I'm sure they're terrific, I didn't work with the program's backup features. Once I discovered that you can't print labels or number your disks, this cat decided to send Cat Back back.

In search of a cure for Creeping Floppy Syndrome

OffLine 3.0.3

AT LEAST THIS CONTENDER (SNA) doesn't look like a relic programmed during the Reagan administration—it's not composed primarily of hideous Monaco-font text in rigid rows, like some of the older programs. Better yet, OffLine does *almost* everything you'd hope. It catalogs any kind of disk—hard, floppy, or otherwise. It shows you (and sorts) a list of disks, and when you double-click on a disk, shows its contents (including what's

continues

FLOPPY-FILER FACTS

	Cat Back	Curious Cat	DiskQuick	Disk Ranger	DiskTrivia	DupLocator	MacLibrarian	OffLine
Price	$99	free	$49.95	$59.95	free	$99	$30	$99.95
Floppies per minute	12	10	NA [1]	6	4	8	3	4
Generates serial numbers	○	○	○	○	●	●	●	●
Catalogs nonfloppy disks	●	○	●	●	○	●	●	●
Prints disk labels	○	○	○	●	○	○	●	●
Exports text files	●	[2]	●	●	●	●	●	●
Shows folder hierarchy	○	○	●	○	●	●	●	●
Sorts/searches disks	●/○	○/●	●/●	●/●	●/●	○/○	●/●	●/○
Sorts/searches files	●/●	○/●	●/●	●/●	○/●	●/●	●/●	○/●
Catalogs StuffIt or Compactor archives	○	○	○	○	○	●	●	●
Shows a list of disks	○	○	●	[3]	●	○	●	●
Balloon help	○	○	○	●	○	●	○	●
Choice of fonts	○	●	●	○	●	●	●	●
Updates changed disks	○	○	○	●	○	○	●	●
Background cataloging of new disks	●	○	○	●	○	○	○	○

● = yes; ○= no; NA = not applicable. [1] Cataloging process halts after two or three disks. [2] By copying to Clipboard. [3] Only four at a time.

inside StuffIt and Compact Pro archives); and—yes!—it prints gorgeous labels. (By the way, please don't think I have some kind of disk-label fetish. Listen, how many times have you inserted a floppy disk into your Mac just to see what's *on* it? Now imagine that you could tell just by looking at the disk in your hand. Let me tell you: it's a heady experience.)

OffLine is no speed demon; it catalogs disks at a poky four per minute, and takes its sweet time searching for files. Its views are great—one shows you the contents of a disk, and another shows the results of your searches—but you can't see the contents of more than one disk at a time, nor can you see both the contents view and the search-results view simultaneously. And it could be smarter about printing labels—if there are too many files to fit in one column, it chops off the remaining names instead of starting a second column. Still, OffLine is, if not lovable, at least a practical librarian.

Curious Cat 1.1

A GLANCE AT THE FLOPPY TABLE MAY convince you that Curious Cat is a total feature wimp. It doesn't do labels, or list disks, or catalog hard drives, or even export. It does, however, catalog a floppy every six seconds and show all the files in a list. This program has a funny little gimmick, too: it can search for fonts and desk accessories *within* other files (such as a System file). And when you click a font-or-DA-containing file, a list appears in a second window that instantly identifies exactly which fonts or DAs are inside.

This program—and the similar shareware QCat—are really file listers. They're not quite the Holy Floppy-Management Grail, but they do help you spot duplicate files (and, in this case, know instantly what's inside a font suitcase).

DupLocator 1.0

THIS BEAUTIFUL, PAINSTAKINGLY POLished file-finder/duplicate-nuker isn't really designed as a floppy-disk organizer (Midnight Software). It does resemble one: it reads eight disks per minute, lists their contents colorfully and elegantly, and lets you search, sort, launch, copy, delete, rename, or get info on the files thereon. The crisp interface design and intelligent manual round out the happy little package.

DupLocator's raison d'être, as the clever title implies, is to ferret out duplicate files amid your disk collection; and this it does, nearly instantaneously. Once they're found, you can easily compare the folder locations of the duplicates, compare their modification dates, and delete the ones you don't want. Our quest for the elusive grail of catalogers goes on, however: DupLocator can't show a list of disks, sort files by disk, or print labels. More incredibly, it can't save your catalog. You read right: every time you want to find a particular file, the program has to re-create its knowledge of your collection by rescanning every single disk. Midnight Software hints that these frustrating limitations may evaporate in future versions of the program.

Weber NoLabelSystem

I WAS AMUSED AND IMPRESSED THAT this eccentric, eminently practical disk-*labeling* system—much touted when it made its debut in the early, news-bare days of Macintosh—is still for sale (Weber & Sons, $23.95 for 50 pockets/100 cards). On each floppy you affix a clear plastic pocket. Then you fill out a little index-style card, complete with a tab that protrudes above the disk's edge, and slip it into the pocket.

The point is that you can now change the disk's label as easily as slipping in a different card, without getting label goo under your fingernails. People will think you're a little kooky, but those tabs sticking up sure make it easy to browse a box of 100 disks and find the one you're looking for. The additional $29.95 MacDisk-Manager software is the only label-printing program on the market that lets you see and edit a label before it prints. But drat, it has at least one big-time bug. Instead of printing 12 little disk labels on the laser-feedable tagboard sheet of 12 perforated disk-cards, it prints just one humongous label across the entire sheet. The company had no idea how to solve the problem.

Incidentally, unlike companies like Adobe and Claris, who puff up their software boxes with pointless blocks of foam rubber, all of the companies whose products are reviewed here send you a manual and a disk—that's it. No box, no filler. Weber & Sons does even better—they send a cardboard box, but it's sized and shaped to double as a floppy-disk storage box. If we had more clever ideas like that, we'd worry a lot less about the environment.

MacLibrarian 1.5.4

AS MY DEADLINE ROLLED AROUND, I began to panic. After immersing myself in the best the software world had to offer, I hadn't found one single real, honest-to-gosh, lickety-split, plain-and-simple disk cataloger.

I even tried to jury-rig some kind of disk-management setup using System 7's alias feature. You know, make an alias of every single file on every single disk, and keep all those aliases in one folder on the hard drive. I'll just say this once: *way* too much trouble.

continues

When a bug showed up in a new program, the first to know was a guy in Montana. And everyone on CompuServe.

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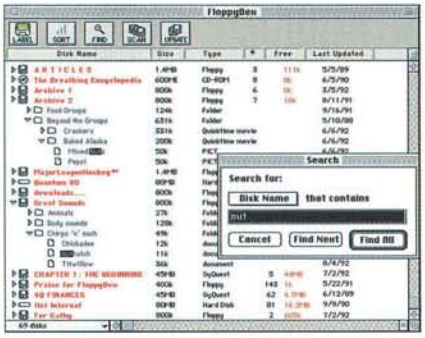
Finally, at the eleventh hour, I stumbled across a shareware gem-in-the-rough that had just appeared on America Online: MacLibrarian. There are three windows, which may be side by side. One lists your disks (searchable and sortable); another, your files (likewise); a third shows the contents of any disk you double-click, in hierarchical tree format. All the info you could ever want is displayed in columns, very much like a spreadsheet: name, date, size, and so forth; you can hide, rename, or rearrange the columns.

This program prints labels—even comes with ready-made templates for popular labels, like Avery 5196 disk stickers. And if you don't like how they look, it's your own darned fault, because its mini-MacDraw graphics window lets you snazz them up with pictures, lines, any arrangement of the file information, and your favorite fonts. (Warning: The program somewhat mean-spiritedly slaps a "Register your version of MacLibrarian" logo on top of each label, which goes away when you send in your $30 to the author, Behrouz Poustehi, and he tells you the secret code.)

I love discovering that a shareware program whomps its commercial competition in shine and polish. Therefore, it breaks my disk-filin' heart to say that some of MacLibrarian's features don't work ("The Arc tool does not work as intended so avoid using it," says the Read Me file with impressive candor); the cataloging process lumbers along at a grueling three disks per minute; and I unearthed a handful of bugs. But make no mistake: in design and convenience, MacLibrarian is the best thing out there.



FloppyDex This powerful floppy-disk cataloger doesn't actually exist. But you can see why it should: there's a clean, simple interface (stolen from Attain's In Control); a nifty nested folder scheme (stolen from the System 7 Finder) that lets you see what's on any disk (or disks) without opening a separate window; and a powerful label-printing feature that actually shows you an editable preview of each label. Double-click on any icon to see an information window with detailed information. And—as long as we're making stuff up—the price is $20.

The Upshot

OBVIOUSLY, MACLIBRARIAN IS THE PRIME pick. Given its try-before-you-buy shareware-ishness, there's absolutely no reason not to grab it and see if it can make some sense of your disk heap.

Some cranky streak of perfectionism deep within my soul, however, remains unfulfilled, yearning for a truly gorgeous, graceful, great disk-ographer. Something that reads your floppies fast, makes a searchable, collapsible disk list, and prints nice-looking labels that don't pointlessly truncate file names (and does clever things like turning the list sideways to fit more file names onto a label). Something like the fictional FloppyDex, pictured here. Is that such a tall order? I mean, sure, CD ROMs are great, and SyQuests are handy, but floppy disks aren't going to disappear anytime soon. Especially not the 750 of them on my desk. **m**

Contributing editor DAVID POGUE, author of *Macs for Dummies* (IDG Books Worldwide, 1992), has mastered the difficult art of handwriting on the 1/16-inch spine of a floppy disk.

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New Products

The Latest Macintosh Releases

EDITED BY CAROLYN BICKFORD

THIS SECTION COVERS MACINTOSH PRODUCTS FORMALLY ANNOUNCED BUT NOT YET EVALUATED BY MACWORLD. ALL PRICES ARE SUGGESTED RETAIL. PLEASE CALL VENDORS FOR INFORMATION ON AVAILABILITY.

HARDWARE

CM2070LR Color Monitor
Trinitron 20-inch monitor offers noninterlaced resolution up to 1280 by 1024 at 70Hz; treated with antiglare coating. Meets Swedish MPR II ELF-emission guidelines. $2999. Seiko Instruments, 408/922-5900, 800/888-0817; fax 408/922-5835.

Horizon Color Scanner
Flatbed scanner provides variable resolution up to 1200 by 1200 dpi to scan original up to 8 by 15 inches. Built-in transparency module allows scanning of transparencies. $22,500. Agfa, 508/658-5600, 800/685-4271; fax 508/658-4193.

LanGarde 400
Universal power supply has power-outage warning, monitors battery condition, and can shut down the network. Removable front panel allows remote monitoring. $499.95. EFI Electronics, 801/977-9009, 800/877-1174; fax 801/977-0200.

LanGarde 400

Mac Extend
Extender box connects to the Mac's ADB port and to a remote unit up to 1000 feet away via a standard RS-232C cable. The remote unit provides a standard ADB port for a second keyboard, mouse, or other ADB device for presentations, training, multimedia applications, and so on. Wireless remote control optional. $699. Presentation Electronics, 916/652-9281, 800/888-9281; fax 916/652-9286.

Magic 128 Turbo Optical
Portable 3.5-inch 128MB optical drive has 34.4ms average seek time and 768-Kbps transfer rate, according to the company. Comes bundled with cartridge and FWB's Hard Disk Tool Kit Personal Edition. $1299. MacProducts USA, 512/472-8881, 800/622-3475; fax 512/499-0888.

Nu32 SCSI Xelerator
SCSI-2 coprocessor board takes advantage of the parallel processing capability of the Macintosh NuBus. Supports data-transfer rates up to 10MB per second when used with SCSI-2 storage devices, according to vendor. Also supports block-transfer mode on Mac Quadras, which can triple the data-transfer rate. $995. Procom Technology, 714/852-1000, 800/800-8600; fax 714/852-1221.

PathFinder
Single-protocol, LocalTalk-to-Ethernet router creates Ethernet and LocalTalk zones on an internet while in Run mode; in Automatic mode, creates a single zone for both Ethernet and LocalTalk devices; in

PathFinder

Configuration mode, allows for full configuration while connected anywhere on the network. Supports thin, thick, 10Base-T, and fiber-optic Ethernet wiring. $899. Dayna Communications, 801/531-0600; fax 801/359-9135.

Plusware Numeric Keypad
Numeric keypad that connects to the Mac's ADB port and has an ADB of its own. Numeric input keys are arranged in standard format, with mathematical function keys. A second-function key offers access to 15 programmable functions, including forward delete; help;

Plusware Numeric Keypad

and page up, page down, home, and end, which double as directional cursor keys. $129. Plusware, 416/477-0015, 800/268-7587; fax 416/477-0250.

PowerSwitch LT
Allows any network device that plugs into a wall outlet, such as a LaserWriter or router, to be turned on or off by network commands. Supports AppleTalk protocols and works on extended and dial-in networks. In Auto mode, the switch can turn off a device after a period of inactivity and turn it on when a user chooses the device. Requires no additional software on any computer on the network. $199. Radiant Enterprises, 415/296-8040; fax 415/392-6860.

P-Shooter
Twelve-port packet regenerator for LocalTalk networks includes wiring kit. Device regenerates packets to increase data integrity. Enables user to

P-Shooter

increase network performance by using active star technology, thus avoiding data collisions on crowded and noisy daisy-chain trunk, backbone, or passive star topologies. $595. PCon, 408/270-3200, 800/726-6462; fax 408/274-4504.

Sonnet TwinSlot LC
Two-slot adapter for Macintosh LC and LC II adds second internal board slot. Includes two-slot adapter board, a new Mac LC/LC II chassis top, and a 40-watt power supply. $549. Sonnet Technologies, 714/261-2800, 800/945-3668; fax 714/261-2461.

Sonnet TwinSlot LC

Spectra Star Q10
Color thermal printer using 80960 RISC processor; ships with Pantone color-matching software, 6MB of RAM, and 20 fonts. The user can directly print up to 99 additional copies of any image stored in the printer's memory by pushing a front-panel button. $4999. General Parametrics Corporation, 510/524-3950; fax 510/524-9954.

SprintTalk/200TR
Printer server allows one or more LocalTalk printers and peripherals to connect to industry-standard 802.5 token ring networks; allows connected Macintoshes to print to a parallel PostScript printer. Automatically converts AppleTalk-compatible TokenTalk protocol to AppleTalk. Has both DB-9 and RJ-45 connections for attachment to token ring cabling. Allows concurrent access by Novell and AppleTalk users. $1495. Digital Products, 617/647-1234, 800/243-2333; fax 617/647-4474.

SprintTalk/200TR

Zoom FaxModem PKT
Send-and-receive Hayes-compatible fax modem that transfers digital data at 2400 bps; can send Class 1 faxes at 9600 bps and receive faxes at 4800 bps. Can be powered by optional 9-volt battery. Features include dual phone jacks, micro speaker, surge protection, and transformer. Includes software for scheduled transmission of faxes, automatic dialing, and broadcast faxing. Seven-year warranty. $149. Zoom Telephonics, 617/423-1072, 800/666-6191; fax 617/423-9231.

Zoom FaxModem PKT

SOFTWARE

Action for Macintosh
Product designed for on-screen multimedia presentations with sound, QuickTime, text, graphics, and animations. Includes templates for creating animated presentations; provides a library of graphics, sounds, and animations. 4MB of RAM recommended. $495. Macromedia, 415/252-2000; fax 415/442-0190.

Bird Brain 2.0
Birding database includes all 1946 species of birds found in North and Central America, Mexico, and Hawaii, according to vendor. Lets user record bird observations and organizes sightings into life lists and reports for viewing or printing. Features include scoreboard view of life-list totals and automatic life lists in which the program notes the first sighting of each species. 2MB min. memory. $125. Ideaform, 515/472-7256; no fax.

Bird Brain 2.0

Disk Café
Formatting utility for hard drives and removable car-

continues

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The new Macintosh IIvx (shown here with our new 14" Macintosh Color Display) is the most flexible Macintosh II available. It's also fast, powerful and extremely affordable.

To take full advantage of its stereo-out sound capabilities, plug in your own pair of self-powered speakers — and get the most out of this great multimedia Macintosh.

A whole new generation of CD-ROM player, the AppleCD™ 300i retrieves data twice as fast as ordinary players. It also supports Kodak Photo CD.

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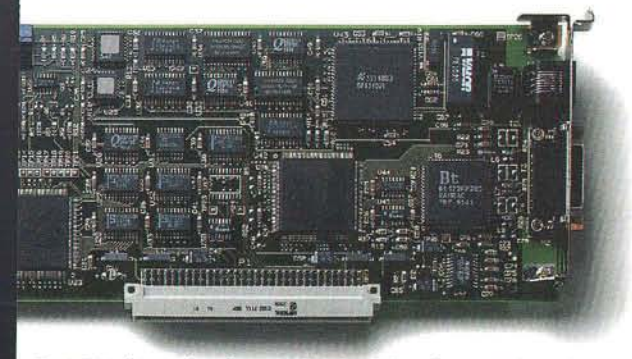
In these times when every budget dollar is precious, the new Apple® Macintosh® IIvx personal computer is ideal.

It's fast. It's powerful. And it costs a lot less than you'd think. But equally important, it's prepared for the next economic expansion, when you'll want to add onto its already vast capabilities.

Inside its sleek exterior resides a 5¼" expansion bay — room for an internal CD-ROM drive, SyQuest drive or other mass storage devices — as well as a standard 3½" bay for either an

Screen photo image source: Kodak Photo CD disc. "When transferring copyrighted video materials, please ensure that you have complied with applicable laws. © 1992 Apple Computer, Inc. All rights reserved. Apple, the Apple logo, HyperCard, Mac, Macintosh and "The power to be your best" are registered trademarks E-Machines, Inc. The Motorola logo is a registered trademark of Motorola Inc. SuperMac and VideoSpigot are trademarks of SuperMac Technology. SyQuest is a

my, one can still find opportunities.



Pop in E-Machines' video/Ethernet card, and get high-performance video and high-performance networking all in one. This is just one of the many expansion cards you can buy separately.

Another option in the 5¼" bay — a 44- or an 88-megabyte SyQuest drive that uses removable cartridges for archiving or transferring large projects.

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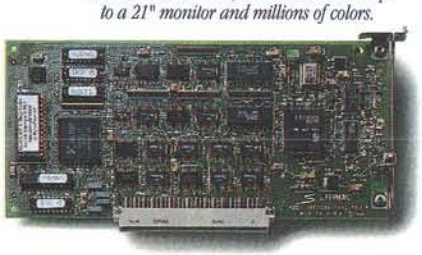
The Macintosh IIvx comes with a microphone and sound jack for adding sound to HyperCard® stacks and QuickTime™ movies or voice-annotating documents.



Plug in a third-party card like the VideoSpigot, and you can transfer video directly from a camcorder or VCR to your hard disk – for making your own QuickTime movies.

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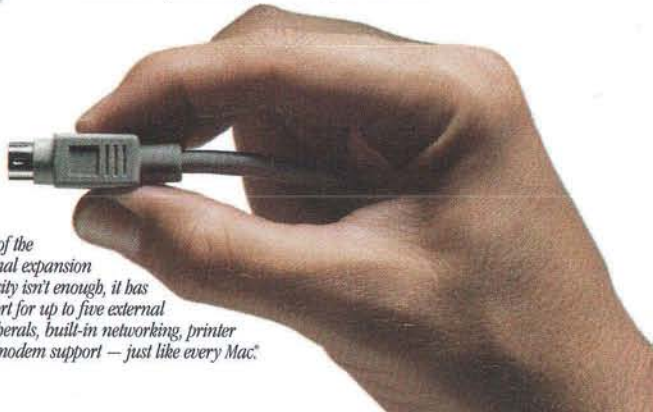

If all of the internal expansion capacity isn't enough, it has support for up to five external peripherals, built-in networking, printer and modem support — just like every Mac.

80-megabyte or a 230-megabyte internal hard disk drive. It also gives you three NuBus™ slots and an accelerator slot so you can add even more power and performance. To see the new Macintosh IIvx for yourself, visit an authorized Apple reseller today. For the power you need most of all. The power of Macintosh. The power to be your best.®

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Disk Café

DNA Groove Templates
System for applying rhythms to compositions made with a Steinberg-Jones Cubase MIDI sequencer. Rhythms have been extracted from popular music and are displayed in a graphic form called a feel chart. Musicians can then impose the rhythms on their music as an alternative to quantization. 1MB min. memory. $110. WC Music Research, 416/444-6644; fax 416/496-2884.

EES
Engineering equation-solving program that incorporates thermodynamic and transport property functions for water, all common refrigerants, nitrogen, methane, propane, and helium, among other substances. Thermophysical property functions operate in either SI or English units. Parametric table allows automation of multiple solutions. 2MB min. memory. $400. F-Chart Software, 608/836-8536; fax 608/836-8536.

ET Calc
Program for landscape professionals to calculate water budgets for planting, irrigation, and landscape management. Considers factors such as soil texture, species water ratings, microclimatic conditions, and density of the landscape so that designs can be evaluated for water use and local water-budgeting compliance immediately. Requires HyperCard version 2.1. 2MB min. memory. $695. Irrigation Management Group, 510/471-2544, 800/421-2600; fax 510/471-6257.

Expert Home Design
Home-design software allows user to move representations of furniture, windows, and walls with the mouse. Drawing tools enable user to add elements, and include measuring, copying, replacing, and grabbing tools. Precise measurement and scaling controls can display dimensions of objects on screen every time they are redrawn or resized. Features more than 100 customizable pieces in furniture library, and import and export capability. Allows rotating in 1-degree increments and arranging objects in multiple layers. 2MB min. memory. $49.95. Expert Software, 305/444-0080, 800/933-2537; fax 305/443-3255.

Fast Pitch 2.0 Pro
Makes stacks from HyperCard 2.1 or a later version into a presentation or slide show without scripting. Features include slide creation, template support, online help, presentation printouts, presenter notes, and multimedia support. 2MB min. memory. $79.95. Objectic Systems, 206/271-6864; no fax.

FaxManager Plus
Provides optical character recognition (OCR) technology for use with fax documents. Converts fax-based digital information into editable text form, supports 11 text formats, and can be used with more than 70 fax/data modem models. 6MB min. memory. $119. STF Technologies, 816/463-2021; fax 816/463-7958.

FontHaus PictureFonts
Pictorial fonts come in six categories: Transportation & Travel; Commerce & Communication (which includes special elements for creating coupons); Holidays & Celebrations; Food & Drink; Household Items; and Animals. Available in PostScript Type 1 format and utilizes ATM 2.0. 1MB min. memory. $49.95 per set. FontHaus, 203/846-3087, 800/942-9110; fax 203/849-8527.

Guaranteed Undelete
File-recovery utility reallocates file space in the order files were deleted when recovering files. Files, when recovered, can be restored to their original location on the hard drive, thus preventing other deleted files from being overwritten. Includes TrashMaster with Incinerator file-deletion programs. 1MB min. memory. $79.95. Utilitron, 214/727-2329, 800/428-8766; fax 214/727-2329.

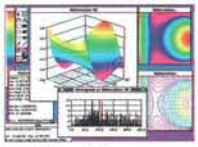
Harmonex X-Ray
X-ray modeling and simulation package for engineers and researchers. Functions include X-ray attenuation coefficients for all elements from 100 electron volts (eV) to 100 million electron volts (MeV), calculation of transmission of complex objects specified in layers, and modeling X-ray tube spectra. Requires Microsoft Excel 2.2 or later. Includes Excel worksheet templates for many common X-ray calculations. 2MB min. memory. $395. Harmonex, 415/968-1356; no fax.

Image Assistant
Image-editing software lets user choose level of effect by showing 15 thumbnails on screen. User selects desired sample on screen and selects modifications. Requires Mac II. 5MB min. memory. $495. Caere Corporation, 408/395-7000, 800/535-7226; fax 408/354-2743.

Intelligent Tutor
Study series for mathematics; lessons cover levels from grades 7 to 12. Concepts and Skills series teaches concepts, ideas, and methods of math, and consists of six titles: Pre-Algebra; Algebra I; Geometry; Algebra II; Trigonometry and Advanced Topics; and Introductory Calculus. Practice and Review series helps students build problem-solving skills through drills plus practice and diagnostic tests; includes all titles offered under Concepts and Skills and an SAT Math title. 1MB min. memory. $49.95 per title. Intelligent Software, 219/923-6166, 800/521-4518; fax 219/924-9208.

Keyboard TextStack
HyperCard 2.1 stack includes complete text and figures, diagrams, and tables from *Medical Microbiology*, second edition, edited by John Sherris, et al. Enables user to locate, view, manipulate, tag, and save information on key topics in medical microbiology. Topics include the bacterial cell, the biology of viruses, host-parasite interactions, the spread and control of infection, pathogenic bacteria, pathogenic viruses, and pathogenic fungi. 4MB min. memory. $280. Keyboard Publishing, 215/832-0945, 800/945-4551; fax 215/832-0948.

MacPhase 1.2
Analysis and visualization tool analyzes one- and two-dimensional data using mathematical operations, windowing, FFTs, and filtering; visualizes data with plot types, line color raster, contour, 3-D contour, 3-D wire frame, vector, and combination plots. Color table editor lets user customize color table. Supports animation and can play data as sound. Imports and exports other file formats. 2MB min. memory. $159. Otter Solution, 315/768-6221; no fax.



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Catalogs, searches, and browses libraries of multimedia data in PICT, TIFF, EPS, Photoshop, audio, text, and QuickTime formats. Can record a picture from a scanner or frame grabber and automatically catalog it for use at a later time; can open selected items directly in another application. System 7–dependent. 1MB memory recommended. $248. Tulip Software, 508/475-8711, 800/972-9659; no fax.

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Circle 98 on reader service card.

tracks user activity. Program also includes built-in screen saver and virus-protection software. 2MB min. memory. $99. Electronic Learning Systems, 904/375-0558, 800/443-7971; no fax.

Petroglyph Font
Comprises more than 40 Native American pictographs, including goats, bears, flutists, ravens, corn, suns, lizards, and people standing, sitting, and riding horseback. Also includes rock-scratched alphabet. 1MB min. memory. $45. The Electric Typographer, 805/966-7563; no fax.

Resource Navigator II
Media-integration tool for HyperCard 2.1. Enables user to incorporate multiple media resources—such as QuickTime compressed pictures, QuickTime movies, sounds, music from compact disc, and external videodisc sequences—into stacks. Creates, edits, and plays back QuickTime movies. Allows user to choose characteristics of media type, such as borderless windows, and does not require scripts or programming. 4MB min. memory. $99. Bliss Interactive Technologies, 512/338-2458; fax 512/892-5282.

Space Quest I: The Sarien Encounter
The mission in this game is to help space janitor and swashbuckler Roger Wilco recover the stolen star generator from the villainous Sariens. Game includes 8-bit color graphics, full-stereo soundtrack, sound effects, and new puzzles. Design emulates 1950s sci-fi movie; has mouse-driven interface. 2MB min. memory. $29.95. Sierra On-Line, 209/683-4468, 800/326-6654; fax 209/683-3633.

Space Quest I: The Sarien Encounter

Sprout
Graphic vegetable-garden-design program lets user draft garden plans with predrawn vegetable and garden symbols; planting tool positions vegetables with the correct row and plant spacings. Program gives growing information and tips, shows the size of planted areas, gives seed and row spacings, determines the number of people a garden will feed, and estimates of the number of seeds needed. 1MB min. memory. $79.95. Abracadata, 503/342-3030, 800/451-4871; fax 503/683-1925.

Sprout

Square One
This file launcher provides a palette of icons representing each installed application and lists documents that can be opened by each application. The launcher can open any folder, disk drive, control panel, or desk accessory that has been installed. 2MB min. memory. $59. pbm software, 415/508-1536, 800/995-8707; fax 415/508-9436.

StrataClip 3d
Reads and edits 3-D clip art from Strata's 3-D clip art libraries. User can rotate and scale images; edit light-source position, intensity, and color; and manipulate the object and vanishing point to create different viewpoints. Images can be exported as PICT, TIFF, or EPS files. 3MB min. memory. $229. Strata, 801/628-5218, 800/678-7282; fax 801/628-9756.

Sun Clock
Displays the areas of day and night for the current date and time on a world map. Display moves as time passes, to keep pace with the earth's rotation. The shape dividing day from night changes with the seasons, as the days lengthen and shorten. Also available as an After Dark or Pyro screen saver, $20. 1MB min. memory. $40. MLT Software, 503/452-0652; no fax.

Tbx System
Provides HyperCard developers with full access to the Macintosh Toolbox while remaining entirely within the HyperTalk language. Accesses more than 1200 Toolbox routines and 1800 records through two external functions. Requires HyperCard 1.2; also works with SuperCard. 2MB min. memory. $100. Tuesday Software, 805/962-7889; fax 805/564-8955.

CD ROMS

Beyond the Wall of Stars
Interactive multimedia adventure involves user in future journey to the planet Tara. Participant qualifies for journey by describing personal characteristics, which the program factors into the situations that develop during the voyage. User faces decisions about what direction to go, strategy, tactics, and teamwork in the form of games, puzzles, and other problems to be solved. 3MB min. memory. $69.99. Creative Multimedia Corporation, 503/452-5933, 800/776-9277; fax 503/452-5930.

CPM Graphic Tutors
Interactive animated tutorials complete with music and vocal explanations: CPM Graphic Tutor 1 covers Adobe Illustrator 3.0, Adobe Separator 3.0, Adobe Streamline 2.0,

CPM Graphic Tutors

and Lettering Effects 2.5, as well as scanning and painting procedures. CPM Graphic Tutor 2 covers Adobe Photoshop 2.0.1 and color theory. User can toggle between lessons and program. 2MB min. memory. $489 each. Casey's Page Mill, 303/220-1463, 800/544-5620; fax 303/220-1477.

Marble & Granite

Marble & Granite
Set of two CD ROMs containing library of digitized marble and granite images. Includes medium- and high-resolution TIFF images for use in prepress production; specialized images for use in 35mm slides, multimedia presentations, and QuickTime movies; and beveled buttons and mortices developed from five different marble styles. Also includes images of 72 seamless marble tiles, 54 floor tiles, and 36 decorator tiles. 4MB min. memory. $349. Artbeats, 503/863-4429, 800/444-9392; fax 503/863-4547.

Sports Illustrated CD-ROM Sports Almanac

Sports Illustrated CD-ROM Sports Almanac
Interactive CD ROM reference guide of statistics and sports coverage. Includes sound-captioned pictures and articles by *Sports Illustrated* writers. 2MB min. memory. $59.99. Warner New Media, 818/955-9999, 800/593-6334; fax 818/955-6499.

ACCESSORIES

Chemistry Mousepad
A mousepad imprinted with the periodic table, along with atomic weights listing up to five significant figures. Measures 9 by 7 3/4 inches with red printing on gray fabric background. $14.95. Cirrus Technol-

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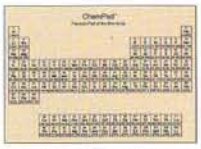
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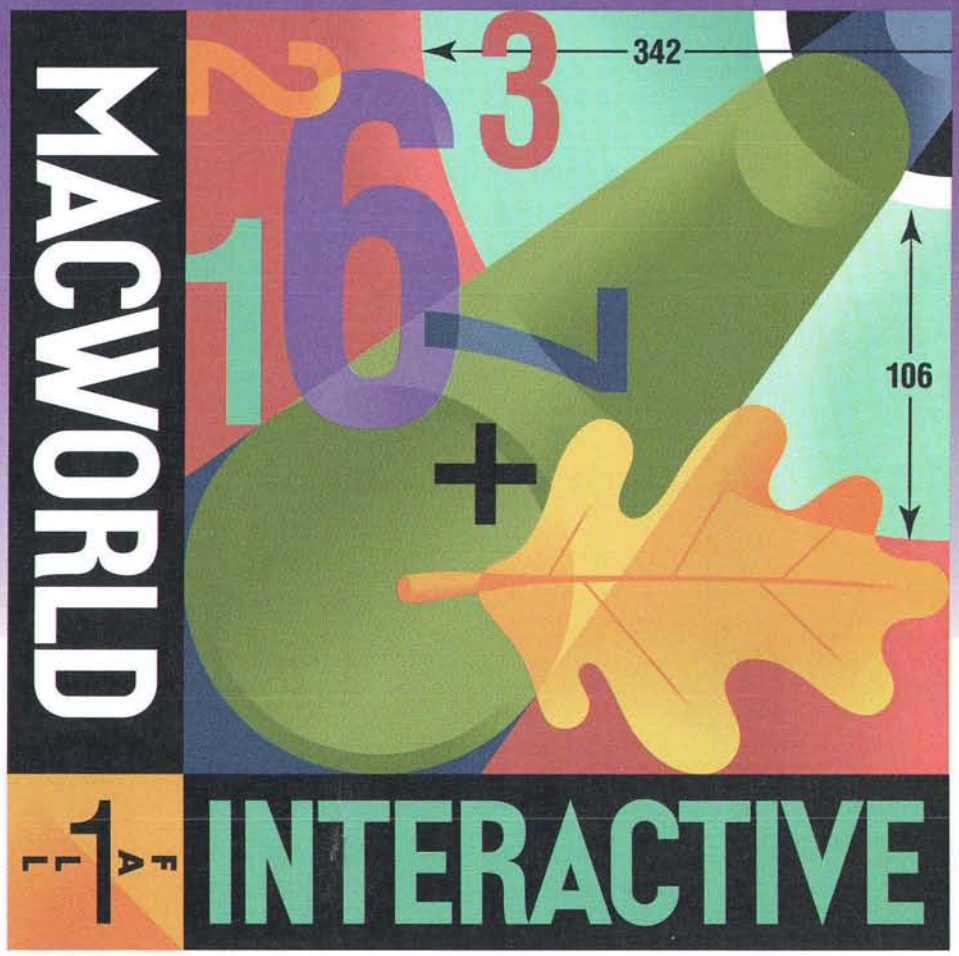

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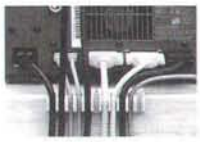
Keeps computer and electrical cables organized so that cords do not get tangled. Installs with adhesive mounting. Lifetime warranty. $9.95. Curtis Manufacturing, 603/532-4123, 800/955-5544; fax 603/532-6615.



Curtis Cable Organizer

Curtis Clean Screen
Cloths for cleaning coated or uncoated monitor screens and antiglare filters. Provide protection against static. Can also be used for cleaning keyboards, calculators, and other office equipment. Package contains eight premoistened cloths, eight drying cloths, and one lint-free towel. $9.95. Curtis Manufacturing, 603/532-4123, 800/955-5544; fax 603/532-6615.

Curtis Macfeet
Nonskid rubber feet tilt the front of the Macintosh up for an alternative viewing angle. Fits SE, SE/30, Plus, and Classic models. Lifetime warranty. $14.95. Curtis Manufacturing, 603/532-4123, 800/955-5544; fax 603/532-6615.

Curtis Macfeet

Curtis Security Kit
Padlocked steel cable secures computer, keyboard, and peripherals to desk or other object in order to prevent theft. For Plus, SE, and Mac II models. Lifetime warranty. $29.95. Curtis Manufacturing, 603/532-4123, 800/955-5544; fax 603/532-6615.

Darkfield Image Enhancer
Black curved visor made of closed-cell sponge material eliminates light reflections on monitor and absorbs glare to reduce eyestrain. Various sizes are available for different-size monitors. $29.95 for 12- to 14-inch monitors, $35.95 for 15- to 17-inch monitors. Advanced Environmental Systems, 415/626-1625; fax 415/626-0206.

MacShackle
PowerBook lock attaches a PowerBook 140, 145, or 170 to a conventional cable lock (included). Bar-shape lock made of aluminum alloy weighs 22 ounces. $49.95. Jeff Lastofka, 818/597-1518; fax 818/597-1518.

MacStereo
Mac-to-stereo transmitter sends computer sounds to any FM stereo system up to 50 feet away, or uses internal speaker that is in it. Especially useful for hearing full-spectrum music, realistic synthetic speech, or game sounds, and for recording computer sounds onto audiotape, according to company. $119.95. Acrotech, 818/449-3256; fax 818/449-5628.

MacStereo

Matplus Leather Mousemat
Mouse pad made of South American cowhide is spill-, stain-, and wear-resistant, according to company. $15. Concept Designworx, 602/649-9110; fax 602/649-9119.

MediaMate FasTrac Mouse Pads
Mouse pad available in six colors: jade, electric blue, raspberry, yellow, grape, and platinum. Has plastic surface resistant to spills and dirt. $6.95. Hunt Manufacturing, 800/765-5669; fax 704/872-1766.

Mouse Wheel
Steering wheel for driving simulations attaches to mouse. A steering-column shaft drives the mouse ball, which translates wheel movements into corresponding mouse signals. $49.95. Colorado Spectrum, 303/225-6929, 800/238-5983; fax 303/225-1663.

PC SoftLens
Optical polyvinylchloride film filter conforms to monitor surface and can be removed and reapplied repeatedly. Filter eliminates light glow around characters and shapes on screen, according to the company. Available in two colors to maximize contrast: light gray for color, and gray for black-and-white screens. Product fits monitors up to 14 inches. $34.95. Ergo-Tech, 714/279-1345, 800/729-1345; fax 714/279-1364.

Pear
Timer and hand exerciser; alerts computer operators to take rest breaks from repetitive-motion activity and offers gentle massage to hands and arms where muscle spasm and forearm tendinitis are common. Timer offers programmed break periods at 30-, 60-, 90-, and 120-minute intervals. $69.95. HWE, 818/760-1801, 800/742-5493; fax 818/508-6356.

See Note Multi-Pad
Protective see-through flap allows this mouse pad to be a scanner pad or desk organizer. As a scanner pad, it holds text or graphics in place as the scanner moves across the image; as a mini desk organizer, it holds important notes close at hand. $8.95. Computer Coverup, 312/327-9200, 800/282-2541; fax 312/327-9078.

See Note Multi-Pad

SX Fusing Assembly Master Rebuild Kit
Two-hour video shows procedures necessary for repairing the fuser assembly from a Canon model SX laser engine, which is used in the Apple IINT and NTX and Hewlett-Packard model II and III printers. Master repair kit included with video contains a manual, parts, tools, and other supplies that are necessary to repair fuser assemblies. $395. Diversified TechniGraphics, 714/855-3838, 800/457-5776; fax 714/855-3959.

The World's Greatest Computer Disk Stickers
Computer disk labels feature four different designs with sayings: the Cheshire cat with a saying from Lewis Carroll, Stan Laurel with a quote from George Santayana, a laughing moon with a quip from Oscar Wilde, and a set of lips with words from Alfred, Lord Tennyson. $2.95 for pack of 12; $44.25 for set of 30 (12-sticker) packets. Black Eye Design, 415/424-8502; fax 415/424-8502.

BOOKS

Macintosh Bible, Fourth Edition
Fourth version of popular Mac companion containing tips, tricks, and shortcuts; contains more than 800 pages of new material and has been revised to reflect current technology. Edited by Arthur Naiman, Nancy Dunn, Susan McCallister, and John Kadyk. $32. Peachpit Press, 510/548-4393, 800/283-9444; fax 510/548-5991.

QuarkXPress: Making the Most of Your Negative Experiences
Step-by-step instructions for producing documents such as business cards and presentation folders using QuarkXPress. Uses common printing terms such as "work and turn." Includes $3 offer for corresponding template disk, and E-scale and clear-film business-reply-mail guide. Written by Cyndie Klopfenstein. $19.95. BK Cynner Productions, 303/465-3891; fax 303/465-6270. m

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Questions and Tips from Macworld Readers

BY LON POOLE

DOES YOUR TRASH EMPTY faster if you hold down the ⌘ key while System 7 counts down the number of items remaining to be removed? Several readers have written to report this as an undocumented feature of System 7, but it is not. It is a feature of FileSaver, part of Norton Utilities for Macintosh from Symantec (408/253-9600). Pressing ⌘ while System 7 empties the Trash prevents FileSaver from tracking the files being removed (making them harder to recover later with Norton Utilities' UnErase).

System 7 Keyboard Layout

FOR MORE THAN 30 SYMBOLS AND ACcented letters, the U.S. keyboard layout that shipped with System 7 uses different keystrokes than the System 6 layout. To type *É* in System 7, for example, you press option-E and then type a capital *E*, but in System 6 you press option-shift-I (*Quick Tips*, September 1992, lists all the changes). In many cases the System 6 keystroke combination still works, but in 15 cases you must learn a new keystroke combination—"a solid pain for people who work in more languages than English," says Juris Mazutis of Nepean, Ontario, Canada. He strongly recommends installing and selecting the keyboard layout oldUS (available in the Typography section of MacSymposium on Connect (800/262-2638, 408/973-0110) and in the Altsys support forum on America Online (800/827-6364, 703/448-8700). However, this won't be necessary if you upgrade to System 7.1, which includes both the System 6 and System 7 keyboard layouts.

You install a keyboard layout by dragging it to the System Folder icon; Finder 7 puts the new keyboard in the System file for you. To select a keyboard use the Keyboard control panel.

Where Fonts Go

Q. Like many Macintosh users who have gone to System 7, I am totally confused about where to put my fonts. Currently my TrueType fonts are loose in the System part of the System Folder. I also have a separate folder containing 1.9MB of PostScript fonts, and another folder containing 1.3MB of bitmap fonts. Both of those folders are in the System Folder. I use Suitcase II, so everyone tells me there should be no problem. But my ImageWriter II takes an inordinate amount of time to print—much slower than when I was using System 6.

Holger Jensen
Golden, Colorado

A. With System 7.0 and 7.0.1, TrueType and bitmap (fixed-size) fonts go in the System file, not the System Folder, and PostScript fonts go in the Extensions folder inside the System Folder (or loose in the System Folder). If you upgrade to System 7.1, all fonts go in the special Fonts folder inside the System Folder. You don't have to remember any of this. Just drag fonts of any type to the System Folder icon (not the System Folder window), and the Finder will put them where they belong.

With Suitcase II (from Fifth Generation Systems, 800/873-4384 or 504/291-7221) or Master Juggler (from ALSoft, 713/353-4090), PostScript fonts can go in any folder that has open TrueType or bitmap fonts.

To speed up an ImageWriter, either install Apple's System 7 Tune-Up 1.1.1 (described in November 1992's *Quick Tips* and available from Apple dealers, user groups, and online information services) or upgrade to System 7.1.

Pasting Custom Icons

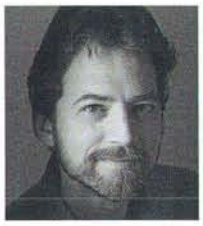
Q. Two of the applications in my Apple menu have generic icons (a diamond with a hand holding a pen). I would like to change the icons under System 7 with the Finder's Get Info command. I copied the icon of a related file in the Extensions folder, but in the Apple menu's info window I can only use the Copy command from the Edit menu. Why is the Paste command dimmed (not available)? How can I paste an icon I have copied into an application in the Apple menu?

David Kopald
San Diego, California

A. The Finder won't let you paste a copied icon into the info window of the System file, Finder, or special folders such as Apple Menu Items, Startup Items, Extensions, Control Panels, and System Folder.

Instead of using the Get Info command on the Apple Menu Items folder, open that folder. Select one of the items whose icon you want to change, and choose Get Info to bring up the item's info window. Then select the icon in the info window; the Paste command should now be available. If not, the item must be open. See if it's listed in the Application menu at the right end of the menu bar. If so, choose it from that menu and then quit it.

Not to get technical, but the items in the Apple menu that you are calling applications are probably desk accessories. Many desk accessories come with generic icons; few applications do. The generic icon for a desk accessory is left-handed, whereas the generic icon for an application is right-handed.



Making Page Setup changes permanent, fishing with RAM, and more

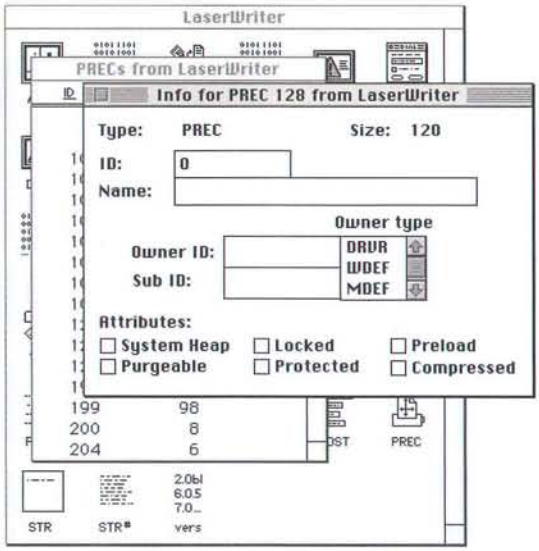
Permanent Page-Setup Changes

Q. How can I make my changes to the settings in the Page Setup and Print dialog boxes permanent? I tried to fix this with ResEdit but didn't succeed.

Rob Kouwenberg
Eindhoven, The Netherlands

A. You can use ResEdit to change the standard settings in the Page Setup dialog, but not the Print dialog. ResEdit is available

continues



New Page Setup Standard You can replace the LaserWriter's standard Page Setup settings with your own. Use ResEdit to duplicate the LaserWriter file's PREC 1 resource, and then change the duplicate's ID to 0 as shown here.

from user groups, online information services, and with the book *Zen and the Art of Resource Editing* (Peachpit Press, 800/283-9444 or 510/548-4393).

Before doing anything else, use the Finder's Duplicate command to make a backup copy of the LaserWriter driver (it's inside System 7's Extensions folder or inside System 6's System Folder). Then follow these steps.

1. With LaserWriter selected in the Chooser, use any program's Page Setup command and make the changes that you want to become permanent.

2. Open ResEdit and use its Open command to open the LaserWriter file. You'll see a window full of icons, each representing a different type of resource in the LaserWriter file.

3. Look for the resource type named PREC and double-click to open it. In the PREC window you'll see all the PREC resources listed by ID number.

4. Select PREC resource ID 0 and press Delete to remove it.

5. Select PREC resource ID 1 and choose Duplicate from the Edit menu to make a copy of it. ResEdit automatically selects the copy and assigns it a new number (usually 128).

6. Choose Get Resource Info from the Resources menu to bring up the resource's info window, and in it change the ID number to 0 (see "New Page Setup Standard").

7. Save your changes and then quit ResEdit.

Resource PREC 0 contains the standard Page Setup settings for the LaserWriter, and resource PREC 1 contains the changes you most recently made to those settings. By replacing PREC 0 with a copy of PREC 1, you replace the factory-standard settings with your own. The standard settings are what the Mac proposes for any document that has never been printed.

If you later change the settings in the Page Setup dialog box while a document is open, those changes may override the standard settings for that document. Many applications save your custom Page Setup settings with the document and reapply them the next time you open it.

Learning to Program

Q. I'm a power DTP guy in a large ad agency who's ready to move on to bigger and better things. I love ResEdit, but neither it nor macros let me do all the things I want to do. So I bought Think C, figuring I could read the manual and be writing Quark extensions or Photoshop plug-ins in a couple of weeks. Boy, was I clueless. Can you shed some light on the secret of C? What program do you write C in? What are some good books for novices, and what reference books are needed?

Tracy Mikulec
Fort Lauderdale, Florida

A. Here's an update on the answer I gave to a similar question a year ago. Pascal is still probably the best language to start with because you need some familiarity with it to read Apple's technical documentation. The concepts and principles you learn about writing Macintosh software will transfer to C or another language if you decide to switch later. You can start with C, but you'll need to learn to read Pascal concurrently. (Of course, learning to read a second language is much easier than learning to "speak" it.)

Just Enough Pascal (from Symantec, 408/253-9600 or 800/441-7234) is an interactive tutorial book (with a disk) that teaches the fundamentals of Pascal; you must also purchase Symantec's Think Pascal separately. Symantec's Think Pascal and Think C have everything you need to develop software for the Macintosh on a Macintosh. They don't have all the bells and whistles of Apple's Macintosh Programmer's Workshop (MPW), but the Think products cost half as much and are easier to learn.

Learning Pascal or C is the easy part. The hard part is learning how to write software for the Macintosh in any programming language. If you have someone else's money to spend, get the $595 interactive training course Macintosh Programming Fundamentals by Apple Computer's Developer University. This course teaches you how to build Macintosh applications in Think C, which you must buy separately. You also need 10MB of hard drive space and a CD ROM drive.

You can also learn Macintosh fundamentals from books. Start with *Macintosh C Programming Primer*, volume 1, second edition (Addison-Wesley, 1992, 800/447-2226 or 617/944-3700), or *Macintosh Pascal Programming Primer* (Addison-Wesley, 1991), both by Dave Mark and Cartwright Reed. The same authors cover more-advanced topics in *Macintosh C Programming Primer*, volume 2 (Addison-Wesley, 1990).

For reference, you'll need a copy of *Inside Macintosh*, volumes 1 through 6 (Addison-Wesley, 1991), by Apple Computer. If you can't afford all six volumes at once, start with volumes 1, 5, and 6. *Inside Macintosh* is being replaced by a series of at least 15 volumes, collectively known as *New Inside Macintosh* (Addison-Wesley, 1992–93). At this writing, three volumes are available: *Processes*, *Memory*, and *Files*. Six more volumes are expected by early 1993, and the remaining volumes are scheduled to be published by midyear.

Apple publishes additional technical

continues

Fixing Paint Text

Ever had a chunk of text in a paint document (bitmap graphic) that needed a minor change? The text might as well be bitmapped in stone. A typical correction would involve erasing the whole blurb and retyping. Instead, try this suggestion from Dan Kuchera of Waterloo, Iowa.

1. Erase just the offending portion of text.

I'm tryin' ta think, and nuttin' happens.

I'm tryin' ta think,

k, but nuttin' happens.

I'm tryin' ta think, but nuttin' happens.

2. In an unused area of the document, type the replacement for the erased text—beginning or ending with a letter you didn't erase.
3. Lasso the correction and drag it into position, using the extra character as a guide.

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information bimonthly in its *Macintosh Technical Notes* series. You can freely copy the notes from a user group, online information service, or anyone else who has them. You can also subscribe to the notes through APDA, the Apple Programmer's and Developer's Association (800/282-2732 in the United States; 800/637-0029 in Canada; 408/562-3910 elsewhere).

RAM-Bam

TIP I must admit that I can no longer remember where I first read about the many suggestions for recycling those otiose and ubiquitous 256K SIMMs. Nonetheless, I remember one joking reference to making them into earrings, coasters, and fishing lures. With my annual family Canadian fishing vacation approaching, I reconsidered the mocking advice and worked two 256K SIMMs into a tandem lure code-named RAM-Bam (see "The Lure of Silicon"). Laird, my 12-year-old son, demonstrating admirable faith in his father's wisdom, put the RAM-Bam to the test and teased a 17½-inch northern pike to byte. As far as I can tell, this is the most obscure feature of 256K SIMMs to date!

Larry R. Bedore
Largo, Florida

The Lure of Silicon When this 17½-inch northern pike snapped at a lure made from 256K SIMMs, Laird Bedore of Largo, Florida, hooked the fish and reeled it in.

Killer 11KHz Sounds

TIP How would you like to sample sounds at 22KHz but have the sound file be half the size, play at 11KHz, and sound as good as the 22KHz original? To get these results you need a set of headphones like Sony's MDR-24 and the microphone that came with your Mac. If your Mac didn't come with a microphone, you can use a MacRecorder (from Macromedia, 415/442-0200). You also need a sound-recording program like SoundEdit (bundled with MacRecorder) and SoundMover 1.6 or later (shareware available from user groups, online information services, or from the author, Riccardo Ettore, 67 Rue de la Limite, 1970 W-Oppem, Belgium).

Put one headphone over the microphone and record the sound at a 22KHz sample rate with Macromedia's SoundEdit or another sound-recording program. Don't use an 11KHz sample rate; it filters out the high frequencies. Headphone placement on the microphone is critical. You will need to experiment a little to find the sweet spot. Trim any sound you don't want at the beginning and end of your recording and save the sound. (Consult the sound-editing program's documentation for specific editing and saving instructions.)

Next open SoundMover, and use it to create a new sound file and to open the sound file you just saved. Select your recorded sound, and SoundMover plays it and shows its waveform.

Now for the magic: Press ⌘-option while you click SoundMover's Copy button. SoundMover drops half the bits as it copies the sound into the new sound file, halving the sound file size. The halved sound plays back at a sample rate of 11KHz but sounds as good as the original.

Using MacRecorder's line-input jack picks up too much source noise such as tape hiss. The headphone filters out the excess noise and adds its own character, making the recorded sample more natural. This old recording engineer's trick results in the best-sounding samples at half the size. More for less—I like it!

Jim Green
Fort Wayne, Indiana

The halved sound sounded good to me, though not quite as good as the original. The high frequencies seemed to shatter a bit.—L.P.

TeachText Crops Graphics

TIP Need to crop part of that 24-bit screen shot you just made but don't feel like cranking up Adobe Photoshop? Use TeachText. Version 7.0 of this free utility from Apple has the ability to edit PICT graphics files, such as those made when you press ⌘-shift-3 to take a snapshot of the screen. [Apple distributes TeachText 7.0 with System 7.1—L.P.]

You can select part of a graphic by opening it with TeachText and dragging a selection rectangle across it. Then copy the selected area, close the graphic, create a new TeachText document, paste the copied graphic selection, and save the new document. You may discover that you can only select and copy a small area without TeachText apologizing that "there is not enough memory to perform that task!" Fear not, all is not lost! Quit TeachText, and back in the Finder use the Get Info command to increase TeachText's memory size to megaproportions. (I set mine to 2000K.) Now open TeachText and try selecting and copying again.

Bob Rudis
Bethlehem, Pennsylvania

Using PageMaker Links

TIP Aldus widely trumpeted the new Hotlinks feature between PageMaker 4.2 and FreeHand 3.1 in System 7, and it has proven a convenient time-saver for me (forget this publish-and-subscribe stuff). Sometimes I have reason to place Adobe Illustrator files in PageMaker publications. One day I tried option–double-clicking an Illustrator graphic in PageMaker, as you would do to activate a hot link to FreeHand. To my surprise and delight, Illustrator started and opened the graphic file. Because I had turned on the Links command's Update Automatically option in PageMaker, the changes I made in Illustrator were updated automatically when I switched back to PageMaker.

Terry K. Amthor
Washington, D.C.

PageMaker 4.2's Edit Original command (or your keyboard shortcut) can open any linked graphic in its originating application, not just FreeHand and Illustrator graphics. You can even open the graphic in an application other than the one that created it by pressing the shift key while choosing the Edit Original command. Technically, PageMaker 4.2 has hot links only to FreeHand 3.1 and Color Studio 1.5, which means a linked graphic is automatically updated in PageMaker when you save changes to it in those applications. This updating works with graphics in layout view and with inline graphics in the story editor. With other originating applications, changes to the graphic are not updated until you switch back to PageMaker, and only if you used the Edit Original command in layout view, not for an inline graphic in the story editor.—L.P. m

We pay from $25 to $100 for tips published here. Send questions or tips on how to use Mac computers, peripherals, or software (by mail or electronically) to *Quick Tips*, Lon Poole, at the addresses listed in *How to Contact Macworld* at the front of the magazine (include your address and phone number). All published submissions become the property of *Macworld*. Due to the high volume of mail received, we're unable to provide personal responses.

LON POOLE answers readers' questions and selects their tips for this monthly column. His two most recent books are *Amazing Mac Facts* (Microsoft Press, 1991), a collection of the best published tips; and *Macworld* [illegible] System 7 (IDG Books Worldwide, 1991).

System 7 Tricks

BY JIM HEID

ACCORDING TO APPLE, OVER 4 million people are now using System 7—that long-awaited, years-in-the-making version of the fundamental software that enables the Mac to run. Every new Mac now includes System 7; many models can't even run earlier versions. In the fall of 1992, Apple released System 7.1, which includes better support for foreign languages. Although half of all Macs are still running earlier versions of system software, it's clear that System 7 is where the action is.

One of the beauties of System 7 is that many of its advanced features are tucked beneath the surface, where they don't get in the way of beginners. If you haven't read the System 7 manuals (they're not bad) or one of the 7438 books that have been written about System 7, you might be missing out on some of its slickest features. This month, I spotlight a few of them. Along the way, we'll look at some free or nearly free utilities that make a good system even better. These utilities are available through user groups or online services (see last month's *Getting Started* for details on how to download freeware and shareware).

Get Accustomed to Customizing

THE SYSTEM 7 FINDER—THAT SYSTEM program that gives you the desktop with its icons and Trash—provides many more built-in customizing options than did previous Finders. You can do the following:

- Control the appearance of directory windows (which show the names and icons of the application programs, files, and folders on your disks). Using the Views control panel, you can change the font and size of the text in directory windows and you can choose to see as much or as little information as you like about the items on your disks. Note that unchecking items such as size, date, and kind also eliminates those commands in the View menu. If you uncheck Kind, for example, you won't be able to sort the contents of a window according to icon type (folder, application, document). Other tips: Think twice about checking the Calculate Folder Sizes box; it slows the Finder significantly. If you're a neatnik, check the Always Snap to Grid box. This puts the Finder in Mom mode—it always cleans up after you.
- Get rid of the warning dialog box that appears when you choose the Empty Trash command. Select the Trash icon and choose Get Info from the File menu. In the info window, uncheck the Warn Before Emptying box. You'll never see (or be rescued by) the warning again.
- Assign text labels and colors to icons. Using the Labels control panel, you can create descriptive labels (Personal, Work in Progress, Urgent, To Be Trashed, and so on) and then assign them to files or folders using the Finder's Label menu. You can then use the View menu to sort directory windows according to either labels or colors. I don't know anyone who uses this feature, but maybe you'll be the first.
- Customize the Apple menu. Is there a program, control panel, or document you'd like fast access to? Make an alias of the item (as described later) and then move the alias into the Apple Menu Items folder, located within the System Folder.
- Customize disk, file, and folder icons. Not too long ago, creating customized icons meant a fantastic voyage into Apple's ResEdit resource-editing utility (see "Getting Started with Resource Editing," *Macworld*, June 1991). System 7 makes it easy. Select an icon and choose Get Info (or use the keyboard shortcut ⌘-I). In the info window, click on the icon (a border appears around it) and then choose Copy from the Edit menu. Now start up a paint program such as Aldus SuperPaint or Adobe Photoshop. Paste the icon, and then use the paint program's tools to tweak the icon as desired. When you're done, select the modified icon and copy it to the Clipboard. Return to the info window from which you copied the icon, be sure the icon is still selected, and then paste.

You can also create new icons from scanned images. When you paste a large image into the info window, the Finder shrinks it to fit a standard icon size. With this technique, you can easily turn a disk or folder window into a thumbnail catalog of scanned images.

From file sharing to shareware, how to get more out of System 7

Better Balloons

MOST PEOPLE EITHER LOVE OR HATE System 7's balloon help feature, which explains menu commands, dialog box options, and tool palette icons when you point to them. One of the less-likable aspects of balloon help is that you must travel up to the menu bar to turn it on—a long journey if you have a big screen.

Using a shareware extension called Helium (by Robert L. Mathews), you can activate balloon help without leaving the keyboard. If you find the help balloons a little small for your tastes, you can use Helium to change the font and size in which help text appears.

CE Software's QuicKeys keyboard-enhancement utility also lets you turn balloon help on and off from the keyboard. Open the QuicKeys control panel, pull down the Define menu, open the Extensions submenu, and then choose the System 7 Specials command. In the subsequent dialog box, choose the Toggle Balloon Help option and then type the key sequence you want to use. (I use control-help on my extended keyboard, and control-? on my PowerBook. Note that's control, not command [⌘]. You could use ⌘-help, but some programs might use that sequence themselves. Besides, the control key is closer to the help key, making it easier to turn help on or off with one hand.)

Easier Aliases

ONE OF SYSTEM 7'S BIGGEST conveniences is the *alias*. An alias is a small (approximately 1K) file that acts as a remote control for another item, usually another file, or a program, or a folder. When you double-click on an alias, the Macintosh opens the item that the alias points to. This enables you to keep programs and files within their folders but still have fast access to them from other places, such as the

continues

desktop (see "Decked-Out Desktop").

To create an alias, select the original file or folder and then choose Make Alias from the Finder's File menu. Then, drag the alias to its final destination—perhaps the desktop, or maybe the Apple Menu Items folder. The Finder always tacks the word *alias* onto a new alias's name; you can rename the alias if you like. (If you'd like the Finder to append something other than *alias* to an alias name, use Insanely Great Software's shareware utility, by Adam Stein, System 7 Pack, which can perform several other useful System 7 modifications.)

There are even easier ways to create aliases. One is with an extension called FinderHack, by Donald Brown, the creator of CE Software's QuicKeys. FinderHack adds a menu to the Finder called Futz (I said it was easy, not poetic). Select an icon and choose Make Alias in Apple Menu, and FinderHack creates an alias of the icon and puts the alias in the Apple Menu Items folder for you. FinderHack's Make Alias As command gives you a dialog box that lets you name the new alias and specify where you want to store it. FinderHack also provides commands that instantly delete selected icons or move them to the Trash.

Another handy alias maker is AliasThis, by Bruce Oberg and Gordon Sheridan. Dragging an item to the AliasThis icon creates an alias of that item in the Apple menu. Better still is Laurence Harris's shareware Alias Director, which even lets you create aliases that don't have icons—a nice way to avoid clutter if you like to keep aliases on the desktop.

To show that an item is an alias, the Finder puts its name in *italics*. Bill Monk's Alias Stylist utility lets you specify a different type style for alias names.

One problem with aliases is that they remain on your hard drive even if you delete the items you aliased. To fix that, try Maurice Volaski's free TrashAlias, a control panel that automatically deletes an alias when you delete the item it points to. Cliff McCollum's shareware AliasZoo utility helps you keep track of aliases and can also delete orphaned ones.

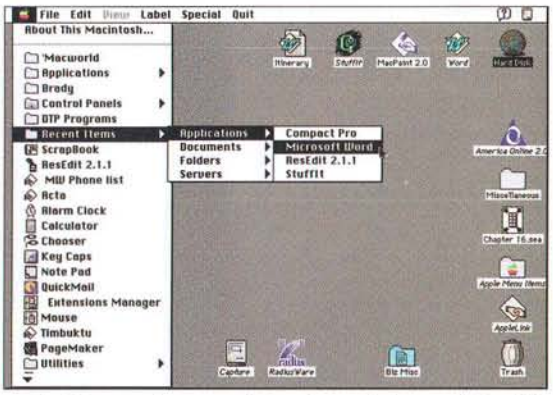
Fast Finding

I'VE MENTIONED IN PREVIOUS COLUMNS that it's a good idea to organize documents and programs within folders. But as your filing system gets complex—with folders within folders within folders—locating and opening a particular file can become cumbersome.

If you know part of a file or folder name, you can use System 7's Find command to open the item with a few keystrokes—no matter how many folders it's buried in. Choose Find from the Finder's File menu (or type ⌘-F) and then type part of the item's name and press return. When the Finder locates the icon, it displays and selects it. Press ⌘-O to open it.

If you click on the Find dialog box's More Choices button, the dialog box expands to reveal additional searching options, which you can use to perform some surprisingly powerful tasks. Want to create an alias for every program on your hard drive? First, create a new folder named Programs and move it to the desktop. Choose Find, click on More Choices and then set up the pop-up menus to read "kind contains application." Next, check the All at Once box and then click on Find. The Finder locates and selects every application program on your hard drive. Choose Make Alias from the File menu, and the Finder creates aliases and selects *them*. Drag one of the aliases to the Programs folder you created; the other aliases are still selected, so they tag along. Now you can use the Programs folder as the gateway to any program on your hard drive.

Here's how to use the Find command to perform a quick backup of all the files that you changed on a given day. Click on the Find dialog box's More Choices button and then configure the pop-up menus to read "date modified is," followed by the current date. Check the All At Once box and click on Find. After the Finder has located and selected all the modified files, drag one of them to the icon of a backup disk (the others will follow, since they're still selected). Of course, you need sufficient free space on the backup disk to hold all the files.



Decked-Out Desktop By placing aliases of often-used files, folders, and programs on your desktop, you can have fast access to items that are otherwise buried within folders. Using an alias of the Apple Menu Items folder makes it easier to hone your Apple menu. This Mac is also running Inline Design's HAM, which turns folders and folder aliases in the Apple menu into hierarchical menus, greatly expanding the Apple menu's usefulness. Also note the Quit command, added by Insanely Great Software's shareware System 7 Pack. After starting a program, you can return to the Finder and choose Quit to reclaim roughly 300K of memory. You can then use a utility such as QuicKeys to start additional programs.

Start Up with These

SYSTEM 7'S SYSTEM FOLDER CONTAINS a folder called Startup Items. Toss an icon in this folder, and the Mac will open it automatically the next time you start up—very handy if you always use a particular program. (To keep your file system orderly, don't toss an actual application icon into the folder—make an alias of the application and use its icon instead.)

You can use the Startup Items folder to automatically open documents, too. In fact, you can use it to open anything that you can double-click on—including sounds. Toss a sound into the Startup Items folder, and you'll hear a silicon serenade each time you start up.

If there's a sound in your System file you'd like to use, here's how to copy it to the Startup Items folder: Open the System Folder, then double-click on the System file to open it. Locate the sound, and then press the option key while dragging the icon to the Startup Items folder. This puts a copy of the sound in the folder instead of moving the original. (This option-drag technique for copying an item instead of moving it works throughout System 7.)

File-Sharing 101

MANY MACS ARE ISLANDS, BUT AT least as many are used where there are other Macs—offices, classrooms, user group meetings. If yours is in the latter group, you'll love System 7's built-in file-sharing features. On the simplest level, System 7 file sharing lets you zap files between Macs without using floppies—connect a cable, click a few times, and one Mac's hard drive icon appears on the other Mac's desktop. You can then shuttle files and folders between the Macs using standard click-and-drag techniques.

Say you want to set up a simple file-sharing scheme to zap files between a PowerBook and a desktop Mac (or any two Mac models). To connect the computers, use a pair of Farallon PhoneNet StarConnectors, which are often discounted to under $20 each. With the cable connected, open the PowerBook's Sharing Setup control panel. Type a name in the Owner Name and Macintosh Name boxes; then in the Sharing area, click on Start. When the control panel tells you file sharing is on, close the control panel.

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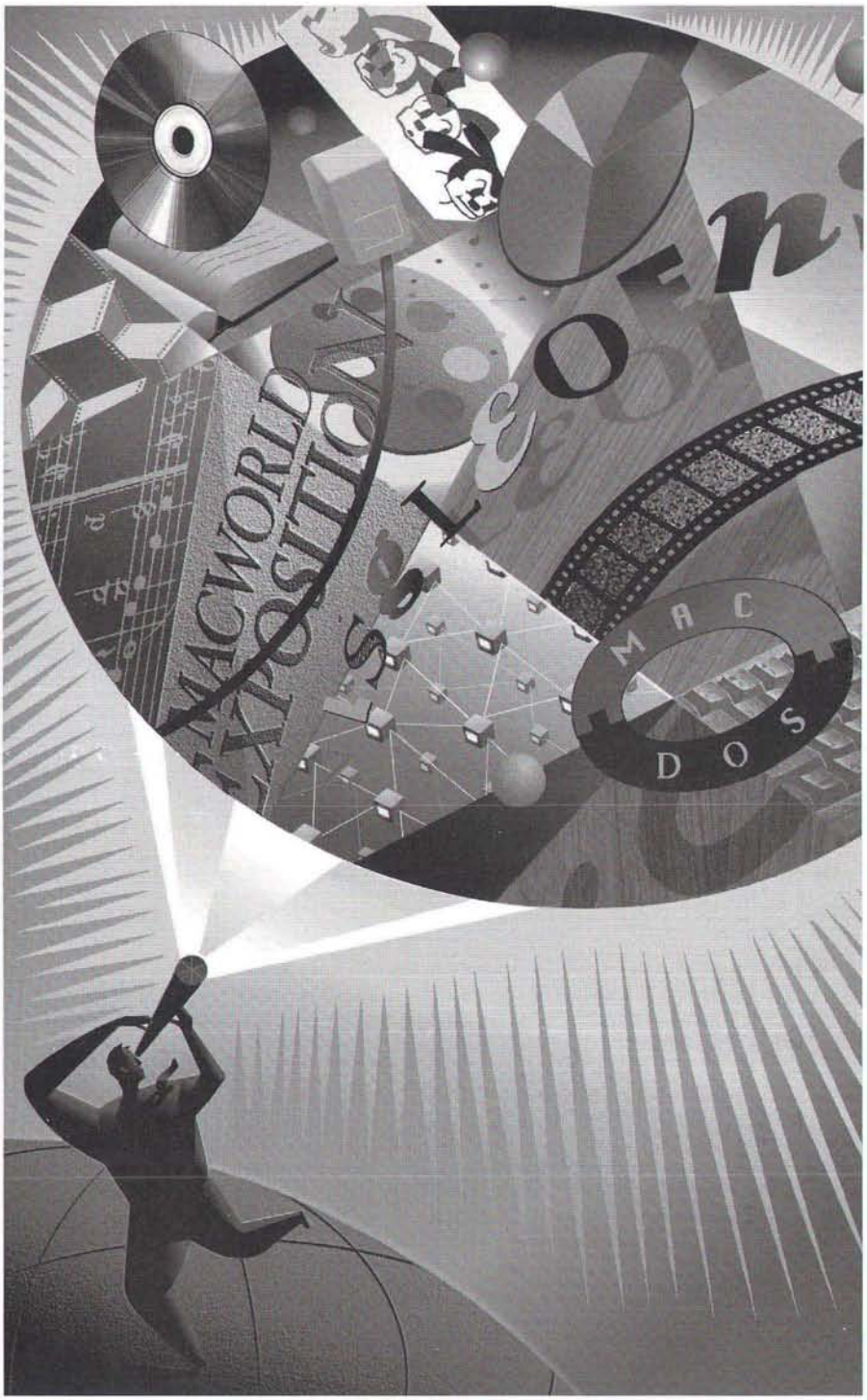

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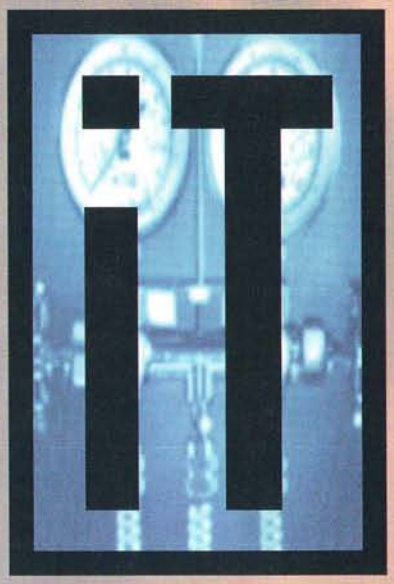

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"Man always kills the thing he loves, and so we the pioneers have killed our wilderness. Some say we had to. Be that as it may, I am glad I shall never be young without wild country to be young in."

ALDO LEOPOLD

"We need wilderness preserved—as much of it as is still left, and as many kinds . . . It is important to us . . . simply because it is there—important, that is, simply as an idea."

WALLACE STEGNER

"The love of wilderness is more than a hunger for what is always beyond reach. It is also an expression of loyalty to the earth, (the earth which bore us and sustains us), the only home we shall ever know, the only paradise we ever need—if we had the eyes to see."

EDWARD ABBEY

"The clearest way into the Universe is through a forest wilderness."

JOHN MUIR

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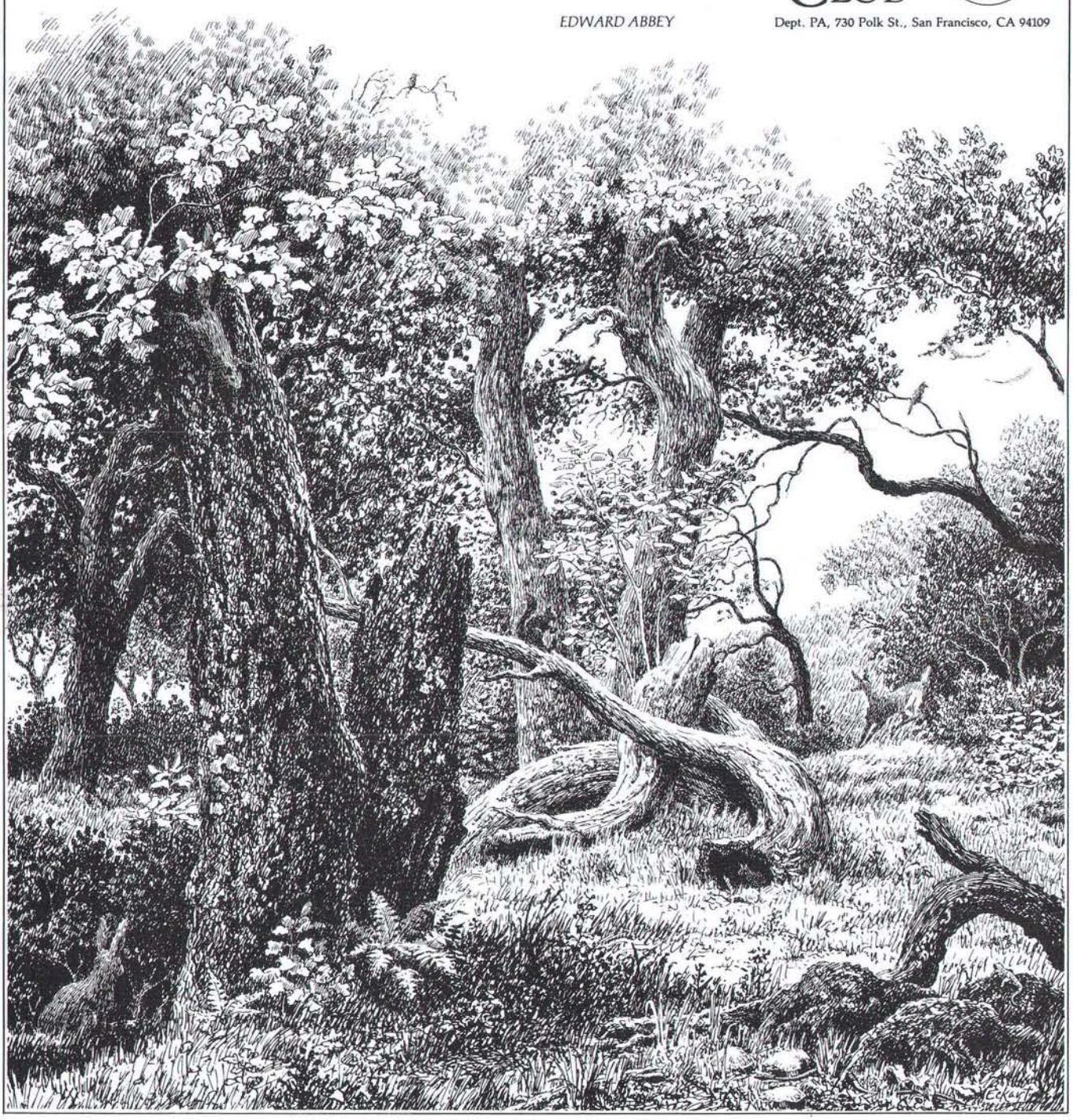


This space provided as a public service.

(If you don't see the Sharing Setup control panel, use the System 7 Installer disk to install file-sharing software.)

Next, select the PowerBook's hard drive icon (if you just want to share a single folder on the hard drive, select the folder's icon instead) and choose Sharing from the Finder's File menu. In the Sharing window, check the box labeled "Share this item and its contents." Below that item, choose Any User from the Owner pop-up menu (see "Sharing Strategies"). Close the window, clicking on Save when asked to save changes. You've just set up the Mac as a file server.

Now go to the other Mac and open its Chooser desk accessory. Click on the AppleShare icon, and the PowerBook name you specified appears in the right side of the Chooser. Double-click on that name, and a dialog box appears. Click on Guest and press return. In the next dialog box, select the hard drive name and press return again. In a moment, an icon for the PowerBook's hard drive appears on the desktop. You can now copy files back and forth between the two Macs.

This scheme pairs up well with the Find command's daily backup trick I described earlier. Once the two Macs are connected, you can use the Find command to locate the day's files for copying.

To avoid threading your way through the Chooser the next time you want to access the PowerBook's hard drive, make an alias of the hard drive icon while you're connected to it. You can automatically connect to the PowerBook by double-clicking on the alias. Or, stash the alias in the Apple Menu Items folder to access it from that menu.

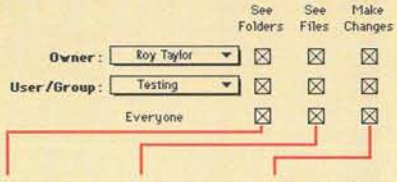
When you're done with the shared hard drive, drag its icon to the Trash. Then return to the PowerBook and turn off file sharing. You save memory, and the Macintosh runs a bit faster if you turn off file sharing when you aren't using it.

For convenience's sake, I've deliberately avoided the security features in System 7 file sharing. When it's just you, a couple of Macs, and some files to be moved, passwords get in the way. When you're part of a larger network, though, you'll probably want to set up *access privileges*—settings for who can see and modify shared files and folders.

Sharing Strategies

To share a hard drive and grant all privileges to anyone who accesses it, select the drive, choose Sharing (File menu), and configure the sharing window as shown at right.

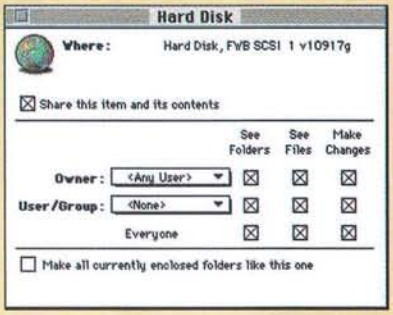
To assign privileges to a specific folder, select the folder and choose Sharing. Then specify the folder's owner and (if applicable) group. Finally, specify the desired privileges for the owner, the user or group, and everyone else.



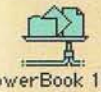
Any folders within the shared folder can be seen.

Files within the shared folder can be seen.

Changes can be made to the shared folder.



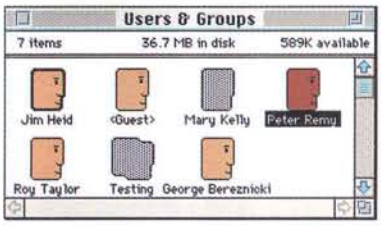
A shared drive or folder icon looks just like any other server. Make an alias of the icon for convenient future access.



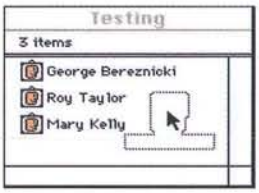
PowerBook 180

Users & Groups

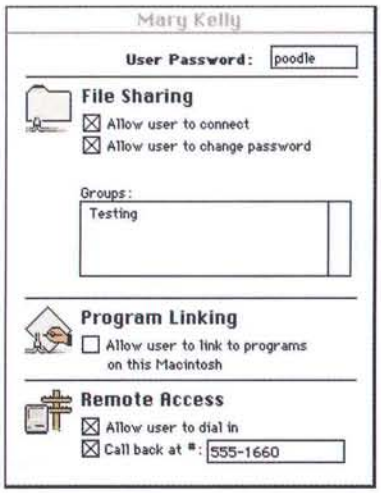
The Users & Groups control panel lets you specify who can access your folders and disks.



Open the control panel, choose New User (File menu), and rename the new user icon. Double-click on a user's icon to change settings.



You can also assemble users into groups. To create a group, choose New Group from the File menu. Rename the group icon, then drag user icons to the group icon—here Peter Remy is being added to the Testing group.



System 7's Remote Access options appear only if Apple's AppleTalk Remote Access software has been installed. This program lets you connect to another Macintosh via telephone modem for sending and receiving files and printing documents.

Access Has Its Privileges

YOU CAN USE SYSTEM 7'S ACCESS PRIVILEGE settings to lock some people out of certain folders. First, open the Users & Groups control panel to specify a list of *registered users*—people who are allowed to access shared items. You might also want to assemble registered users into *groups*—collections of users who work on related projects or in the same department. After creating users and groups, you can control access privileges for a given folder by selecting the folder and choosing the Sharing command (see "Users & Groups" and "Sharing Strategies").

In the previous steps, you set up a *peer-to-peer* file-server system. The opposite of peer-to-peer networking is a *dedicated* file server—a Mac and hard drive, running a program such as Apple's AppleShare server, that provide centralized storage for a group of Macs. A central file server costs more to set up—the AppleShare software itself retails for $1199—but provides better security and is easier to back up, since shared files are in one place instead of scattered across a network. If you outgrow peer-to-peer file sharing, you can upgrade to AppleShare and retain your user and group settings.

Expanding System 7

WITHIN THE PAST YEAR, APPLE HAS RE-leased some optional extensions that enhance System 7's capabilities. The Macintosh PC Exchange extension lets you work with DOS PC disks as if they were Mac disks—great for offices that use Macs and PCs. And At Ease provides a simpler way to start programs and protect your hard drive from modification. It's designed for families whose kids would just love to get in there and rearrange their folks' files (see "Mass Market Macs," November 1992). Another benefit: using At Ease instead of the Finder provides about 200K more memory for programs. It's a good way to shoehorn more into a RAM-cramped Mac.

But few things get a System 7 guru's blood flowing faster than the notion of *scripting*—creating your own short programs that automate repetitive tasks such as backing up and then deleting older files. In the depths of System 7 is a mechanism called *Apple events*, which gives programs the ability to send commands and data to each other. System 7's publish-and-subscribe features (which I examined briefly in last July's column) rely on Apple events to beam data between programs without going through the Clipboard.

With UserLand Frontier, you can write scripts that use Apple events to control the Finder and Macintosh programs. You can create scripts that automate chores you may now perform by hand, such as copying new files from a PowerBook to a desktop Mac, or deleting aliases of files or folders that you've trashed, or decompressing downloaded files and then deleting the compressed archives.

You use Frontier to write, test, and run scripts in programming language, called UserTalk. When you run a script, Frontier broadcasts events to the Finder, and the Macintosh runs on autopilot. Writing scripts that run properly can be frustrating at first—programming often is. Frontier includes a large number of example scripts you can take apart and modify; more scripts are available through online services.

Whether or not you end up as a script writer, take some time to try out the System 7 techniques described here. Keep an eye on *Macworld*'s monthly *Quick Tips* column for more ideas. You'll improve your Mac proficiency, and you'll get more work done in less time. In the end, that's what System 7's features are there for. **m**

Contributing editor JIM HEID looks at a different aspect of Mac fundamentals each month. He covers System 7 and 7.1 in his latest book, the second edition of *Inside the Apple Macintosh* (Brady, 1992), which he coauthored with Peter Norton.

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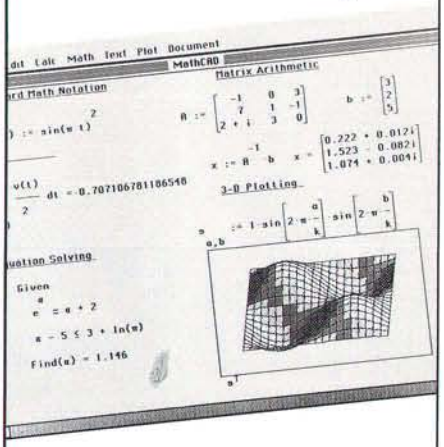

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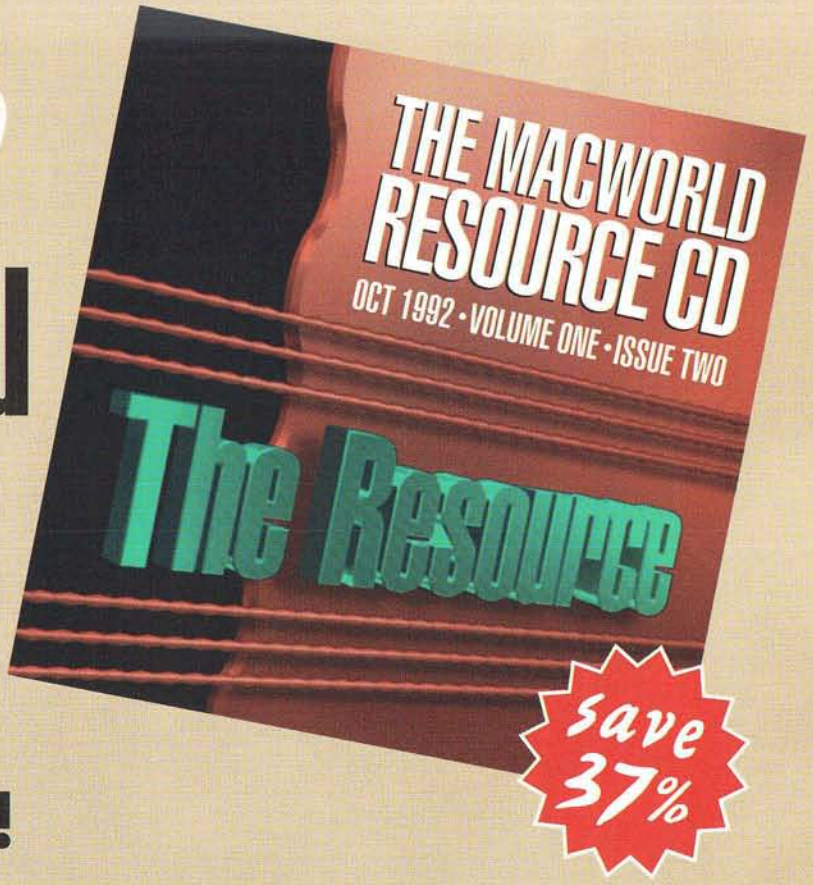

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2-D CAD BROADENS ITS SCOPE

Amiable Technologies 215/222-9066, 800/422-3539.
Ashlar 408/746-3900.
Aura Systems 310/536-9207; fax 310/643-8718.
Autodesk 415/331-0356; fax 415/331-8093.
Claris Corp. 408/987-7000; fax 408/987-3932.
Computervision 617/275-1800, 800/488-7228.
Deneba Software 305/594-6965; fax 305/477-5794.
DesignCAD 918/825-4844; fax 918/825-6359.
Engineered Software 919/299-4843.
Forthought 803/878-7484.
The Graphic Management Group 914/769-7800; fax 914/769-8951.
Graphsoft 301/461-9488; fax 301/461-9345.
IGC Technology Corp. 415/563-3612.
Innovative Data Design 510/680-6818.
Intergraph Corp. 205/730-2000, 800/345-4856.
Microspot USA 408/253-2000, 800/622-7568; fax 408/253-2055.
Palomar Software 619/721-7000; fax 619/621-4758.
Schlumberger 313/995-6000, 800/366-0060.

CRYSTAL-CLEAR PRESENTATIONS

Apollo 516/467-8033; fax 516/467-8996.
Boxlight Corp. 800/497-4007.
Chisholm 408/559-1111; fax 408/559-0444.
Dolch Computer Systems 408/957-6575; fax 408/263-5305.
Dukane Corp. 708/584-2300.
In Focus Systems 503/692-4968, 800/327-7231; fax 503/692-4476.
MacLand 602/800-5802.
NovaCorp Int'l 716/647-6510.
nView Corp. 804/873-1354, 800/736-8439; fax 804/873-2153.
Power R 206/547-8000.
Proxima Corp. 619/457-5500, 800/447-7694.
Sayett Technology 716/264-9250, 800/678-7469.
Sharp Electronics 201/529-8731.
Telex Communications 612/884-4051; fax 612/884-0043.

THE DESKTOP CRITIC

Enterprise Software 310/809-7184.
Graham Software Co. 303/422-0757.
Ideaform Inc. 515/472-7256.
Midnight Software 303/730-3376.
SNA 609/799-9605, 800/628-6442.
Weber & Sons 908/431-1128, 800/225-0044.

THE FULL-MOTION MACINTOSH

Adobe Systems 415/961-4400, 800/833-6687; fax 415/961-3769.
Apple Computer 408/996-1010.
Macromedia 415/442-0200, 800/288-4797; fax 415/442-0190.
Radius 408/434-1010, 800/227-2795; fax 408/434-9575.
RasterOps Corp. 408/562-4200, 800/729-2656; fax 408/562-4065.
SuperMac Technology 408/245-2202; fax 408/735-7250.
Workstation Technologies 714/250-8983; fax 714/250-8969.

GETTING STARTED

Apple Computer 408/996-1010.
CE Software 515/224-1995, 800/523-7638; fax 515/224-4534.
Farallon Computing 510/596-9100; fax 510/596-9020.
Inline Design 203/435-4995; fax 203/435-1091.
UserLand Software 415/325-5700, 800/845-1772.

MANAGING COLOR

Eastman Kodak 800/344-0006.
Electronics for Imaging 415/742-3400.
Quark 800/788-7835.
RasterOps Corp. 408/562-4200, 800/729-2656; fax 408/562-4065.

REMOTE POSSIBILITIES

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Farallon Computing 510/596-9100; fax 510/596-9020.
Shiva Corp. 617/252-6300, 800/458-3550; fax 617/252-6852.
Sophisticated Circuits 206/485-7979, 800/827-4669; fax 206/485-7172.

WORKGROUP PRINTERS

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Compaq Computer 800/345-1518.
Dataproducts Corp. 818/887-8000, 800/756-0556; fax 818/887-4789.
Eastman Kodak 800/344-0006.
GCC Technologies 617/890-0880, 800/422-7777; fax 617/890-0822.
Generation Systems 612/633-5222, 800/654-5294; fax 612/633-3136.
Hardware That Fits 409/760-2400, 800/364-8737; fax 409/539-4141.
Hewlett-Packard 800/752-0900.
Kyocera Electronics 908/560-3400, 800/621-6777; fax 908/560-8380.
LaserMaster Corp. 612/944-9696, 800/950-6868; fax 612/944-0522.
Lexmark International 800/232-3000.
Mirror Technologies 612/633-4450, 800/654-5294; fax 612/633-3136.
NEC Technologies 508/264-8000, 800/632-4636.
NewGen Systems 714/641-8600, 800/756-0556; fax 714/641-2800.
Okidata 609/235-2600, 800/654-4282; fax 609/778-4184.
Printware 612/456-1400, 800/456-1616; fax 612/454-3684.
QMS 205/633-4300, 800/777-7782; fax 205/633-4866.
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Texas Instruments 800/527-3500.
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195-198	Amaze	—	—
110-111	Apple	—	800/795-1000
228-229	Apple	—	800/795-1000
107	Berkeley Systems Design	8	800-248-0800
274-275	Bottom Line Distribution	—	900/420-3636
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91	Digital Vision	242	800/346-0090
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BC	Kensington	—	800/535-4242
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179	La Cie	—	800/999-1182
231	La Cie	—	800/999-1182
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278	Macworld CD Ventures	—	800/631-1700
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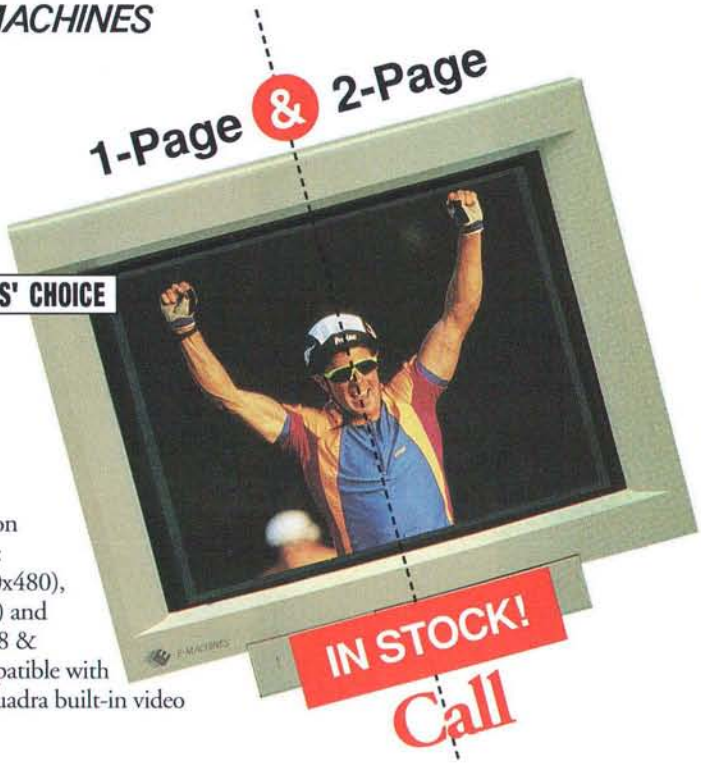

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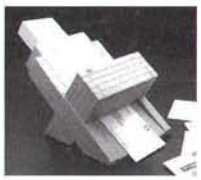

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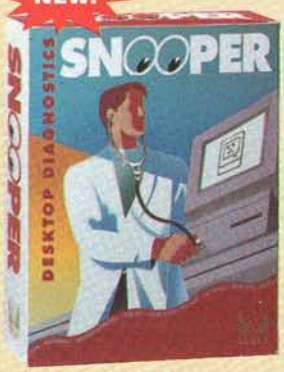

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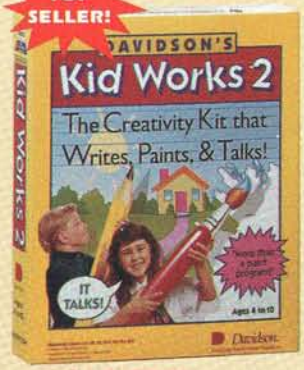

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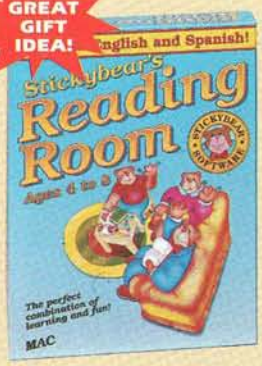

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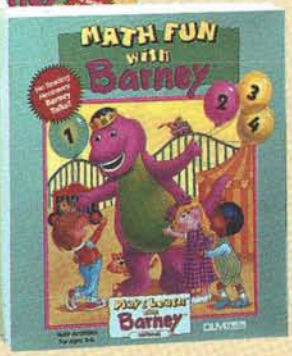

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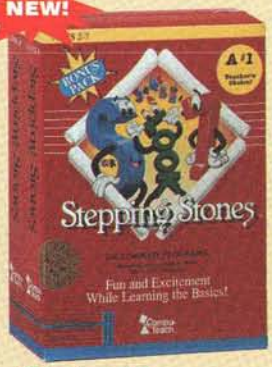

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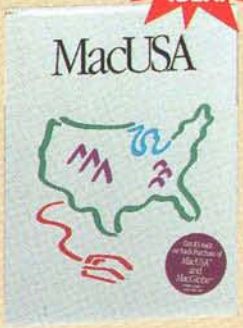

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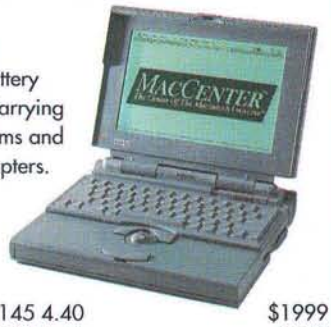

PowerBook 145 4.40	$1999
PowerBook 160 4.40	*$Call!*
PowerBook 180 4.80	*$Call!*

Accessories

PowerBook 140/170 Batteries (2 hr)	$79
PowerBook 140/170 Batteries (3 hr)	$89
Lind Full Cycle Battery Charger	$188
Envisio Display Adaptor (4 MB)	$1049
Envisio Display Adaptor (6 MB)	$1329
Quadra 700 (with System Purchase!)	$3499
Quadra 950	*$Call!*

We also stock IIci, IIsi & IIvx models.

OPTICAL DRIVES

256 MB 3.5" Optical

Ask about our FREE Christmas Puma bundles!!

PUMA captured, but not tame™

Puma 128 MB 3.5" Drive	$1399
Puma 256 MB 3.5" Drive	$1699

- Puma 256 reads & writes ISO/ANSI standard 128 MB cartridges and a true, non-compressed 256 MB
- Fast transfer rate up to 1.2 MB/second
- Fast 35 ms access time
- Optical reliability (10 year Data Life)

128/256 Meg 3.5" Cartridge	$49/$99
600 Meg 5.25" Cartridge	$105

All Puma Optical drives include one cartridge, a universal power supply, 12 megs of shareware, SCSI & power cables, and a one year warranty. Five Year Warranty available!

CD-ROM

NEC

CDR 37 w/ MultiSpin	$379
CDR 37 Gallery Bundle	$499
CDR 74 w/ MultiSpin	$569
CDR 74 Gallery Bundle	$739

NETWORKING

Asante

16k Cards (Nubus)	$169
64k Cards (Nubus)	$219
Asante Print	$369
EN/SC PowerBook	$368

Dayna

EtherPrint	$339
DaynaPORT E/II-T	$149
DaynaPORT SCSI	$269
DaynaSTAR MiniHub	$269

Cayman

GatorBox CS	$1999
GatorPrint	$399

Shiva

LanRover/L	$599
Netmodem/E	$1479

MODEMS

SupraFAXModem

The *SupraFAXModem V.32bis* is the only 14,400 bps modem with 14,400 bps send and receive fax!

MW ★★★★

SupraFaxModem V.32bis w/sft/cbl	$349
SupraFaxModem V.32 wo/sft/cbl	$329

USRobotics

US Robotics Courier HST	$559
US Robotics Courier V.32bis	$599
US Robotics Dual Standard	$799

Global Village

Teleport	$169
Teleport FullFax 2.0	$215
PowerPort/Gold	$625

Hayes

Ultra 9600	$599
Ultra 144	*$Call!*

SCANNERS

UMax MacUser

UMAX

UC630 *600 DPI*	$1139
UC840 *800 DPI*	*$Call!*
UC1200 *1200 DPI*	$3069

Sharp

MacUser

JX-320	$1489

MicroTek

ScanMaker II	$899
1850 ScanMaker	$1499

HARD DRIVES

Falcon Micropolis Drives

		Int	Ext
385 MB	4.4 ms	$1099	$1199
760 MB	4.6 ms	$1399	$1499
1.2 Gig	4.1 ms	$1999	$2099
1.2 Gig 3.5"	10 ms	Call!	Call!
1.5 Gig	4.1 ms	$2299	$2399
1.6 Gig	<11.5 ms	$2999	$3099
2.0 Gig	3.9 ms	$3399	$3499
2.4 Gig	<11.5 ms	Call!	Call!

Five-Year Warranty!
Thirty-Day Money Back Guarantee!

GOLDEN TRIANGLE

Drives include and are formatted with Golden Triangle's DiskMaker™. Micropolis drives are SCSI-2 and Fast SCSI-2, System 7 & A/UX compatible, carry a 5 Year Warranty, include brackets or metal cases, universal power supplies, cables and 12 MB of shareware. MacCenter™ also carries fine drives from FWB, Fujitsu, Quantum, Hewlett-Packard, and Micropolis. Drive capacities are manufacturer's unformatted specifications. Formatted capacities will be less. Access times are effective access times based upon operation of hardware caches.

Circle 77 on reader service card

Prices valid 11/28/92 – 12/28/92

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ACCELERATORS: 68040 & 68030

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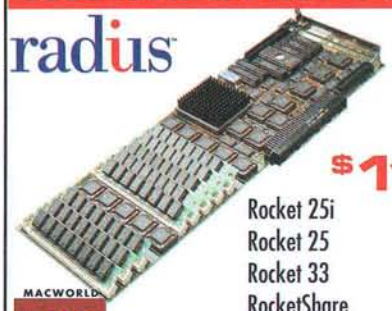

$1199

Rocket 25i	$1199
Rocket 25	$1599
Rocket 33	$1999
RocketShare	$429

MACWORLD MW EDITORS' CHOICE

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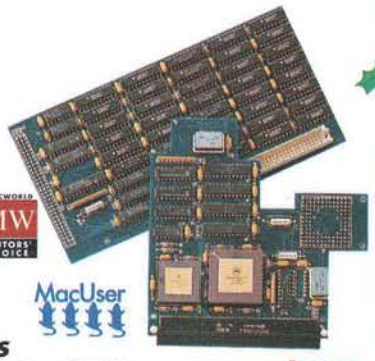
fx/Overdrive II	$329
Quadra 700/Overdrive	$259
Quadra 900/Overdrive	$119
Image Magic-Quadra/PDS	$699

DAYSTAR DIGITAL

SALE!



MACWORLD MW EDITORS' CHOICE

"...this is one Mac purchase you'll never regret." MacWEEK 9/17/91

MacUser

3 Year Warranty

1991 MacUser Choice Winner

All PowerCards & PowerCaches are brand new, in original DayStar boxes. All sales final.

PowerCards

40 MHz PowerCard 030 (IIcx only)	$599
50 MHz PowerCard 030 (II, IIx, IIcx)	$899

PowerCaches *(Non-Universal & Universal)*

40 MHz PowerCache 030	$599/$799
50 MHz PowerCache 030	$899/$1099

SYQUEST DRIVES

Eagle™ SyQuest

$399

Buy an Eagle™ and get two 44MB cartridges for only $89!

Eagle 44	**$399**
Eagle 88	**$499**
44 Meg Cartridge	$65
88 Meg Cartridge	$99

All Eagle SyQuest drives come with a metal case, a universal power supply, 12 megs of shareware, SCSI & power cables and a two year warranty. Ask about our Five Year Warranty.

MONITORS

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MultiSync 3FGx	$639
MultiSync 4FG	$759

SONY

1604 17"	$1099
1304 14"	$649
1320 For LC	$399

LIMITED SUPPLY!

radius **$1895**

21" MONITORS AT A 19" PRICE!

PrecisionColor 21	$1895
PrecisionColor 20	$2459
Color Pivot	$1275
PrecisionColor 24Xp	$499

19" Dual Page Monitor

$739 grey-scale

Lapis

1024 x 828 Resolution @ 74 dpi, with a 75 Hz Flicker-Free refresh rate, same as the Apple Two-Page Display. Available for all Macintoshes.

E-MACHINES

T16 II	$1295
T19 II	$2395
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SUPERMAC

ThunderStorm	$809
SuperMatch 20"	$1499
21" Platinum Monitor	$999
Spectrum/8•24 PDQ	$849
Monochrome Card	$349
VideoSpigot *Starting at*	$399

SIMMs

4 Meg 80ns	$125 (with trade in)
1 Meg 80ns	$35
2 Meg 80ns	$65
6 Meg PowerBook Memory	$259

LIFETIME WARRANTY

Due to the extremely volatile state of SIMM pricing as we went to press, all memory prices subject to change without notice.

- **No Surcharge Or Minimum** with MasterCard and Visa.
- **Your credit card is not charged** until your order is shipped.
- **Personal checks, company checks**, money orders and cashier's checks are accepted; money orders and cashier's checks clear immediately, please allow ten days for personal and company checks to clear.
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- **Money Back Guarantee:** Most products carry a manufacturer's 30 or 60 day money back guarantee. Please ask for details when ordering.
- **All prices, promotions and product availability** are subject to change without notice. We regret we cannot be responsible for typographical errors and cannot guarantee compatibility of all products.
- **All returns must have an authorization number.** Please call 512-445-6483. All returns or refused shipments are subject to a restocking fee.

Hours:
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Sunday: Call, you may get lucky.

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LOWEST PRICES HERE

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$3495
11x17 - 400 d.p.i.

Microtek II XE
$1175
1200 d.p.i. - w/Photoshop

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Mac LC II 4/80	1195
Mac IIci - 5 meg	**2259**
Mac IIci - 5/120	**2750**
Mac IIsi - 5/80	1895
Extended Keyboard	159
Mac Quadra 700 - 4 meg	3550
Mac Quadra 700 - 4/120	3959
Mac Quadra 700 - 4/210	4195
Mac Quadra 950 - 8 meg	Call
Mac Quadra 950 - 8/210	Call
Mac Quadra 950 - 8/540	Call
Mac Powerbook 145 4/40	1995
Mac Powerbook 145 4/80	2450
Mac Powerbook 170 4/40	3495
Mac Powerbook 170 4/80	3749

MONITORS and CARDS

IDEK	
15" SVGA Color Display	595
17" Autoscan SVGA Color	995
21" Autoscan SVGA Color	1795
21" Autoscan 80 KHz Color	2495
Radius	
19" Precision Color Display	**2290**
21" Color Display	2795
Color Pivot	**1249**
Color Pivot Interface II, LC, IIsi, SE, SE/30	**515**
Pivot Display for Built-In Video	799
Two Page Display 19"	959
Two Page Display 21"	1230
Two Page Display Interface SE, SE/30, II, IIsi	399
Precision 8 Interface	515
Precision 24x	1689
Precision 8x	779
Rocket Accelerator 25 Mhz	**1700**
Rocket Accelerator 33 Mhzz	**2195**
Apple	
Apple 13" Highres	649
Seiko	
Seiko CM-1445	569
Sony	
Sony 14" Trinitron	609
SuperMac	
Platinum 19" Display	964
Platinum Two Page Display	1175
Super Match 19" Color	1929
Super Match 21" Two Page Color Display	2839
Super Match 17" Trinitron	1069
Supermac Thunder Storm Pro	2795
Shamrock 14" Color Monitor	399
Dual Mode Trinitron 19"	2459
Thunder/8	1139
Thunder/24	2295

MONITORS and CARDS (cont.)

Spectrum 8.24 PDQ	839
Spectrum 24 PDQ+	1539
Magnavox	
14" Color Monitor	499

DRIVES

	Ext.	Int.
Quantum 105 Pro	469	369
Quantum 210 Pro	835	710
Quantum 240 Pro	909	789
Maxtor 120	489	369
Maxtor 213	729	609
Maxtor 340	1229	1099
Maxtor 180 meg	1800	1679
Seagate 1.2 gigabyte	2269	2149
Syquest 44MB	499	
Syquest 88MB	859	
Internal Drive Kit		29
Syquest 44MB cartridge		69
Road Runner 80 meg for Powerbook		369
Fujitsu 425 meg 5 year warranty		1200

PRINTERS

Microtek TrueLaser	**1149**
TI Microlaser PS35	1329
TI Microlaser PS17	1209
QMS PS410	**1475**
NEC Model 95	1389
Apple Stylewriter	340
Apple Laserwriter IIf	2499
Apple Laserwriter IIg	3279
HP Deskwriter	389
HP Deskwriter Color	**659**
HP IIp for Mac	1539
HP IIIp for Mac	1749
HP III for Mac	2379
HP IIIsi for Mac	4639
HP Deskwriter Ink Cartridge	18
Appletalk Connectors	25
HP Deskwriter 88OC	Call
Newgen Turbo PS 400P (400x400 dpi)	1795
Newgen Turbo PS 630BN (600x300dpi)	2995
Newgen Turbo PS 880B (800x800 dpi)	3895
Newgen Turbo PS 440B 400 dpi 11x17	3495
Color Printers	
NEC PS 40	4395

SCANNERS

Logitech ScanMan 32	279
Microtek II	859
Microtek II XE (1200 dpi) w/Photoshop	**1175**
Microtek 1850s Slide Scanner	**1459**
Umax UC-630 w/Photoshop	1129
Caere Typist	429
Microsoft Word	289
Microsoft Excell	309
Aldus Pagemaker	497

SOFTWARE (cont.)

Adobe Photoshop 2.0	515
Quark Express 3.0	579
Caere Omnipage	499

MODEMS

Zoom	
FX9624 Plus 2400 BPS	129
Modem MX 2400S w/SendFax 9600 BPS	95
v.32 Turbo w/v.42*bis* w/MNP Software	329
Supra Fax Modem 14.4 v.32*bis* (ext.)	349
Supra Fax Modem 96/96 (ext.)	279
PSI for Powerbook 140 & 170 internal 9600/2400	229
Global Village Bronze 96/24 for Powerbook	239
Global Village Silver 96/96 for Powerbook	499
Global Village Gold 14.4/96 for Powerbook	639

ACCELERATORS

Daystar	
40 Mhz Powercache	769
40 Mhz Powercache w/68882	899
50 Mhz Powercache	1075
50 Mhz Powercache w/68882	1495
Radius Rocket	**1700**

MEMORY

1 meg for LC/CI/SI	34
4 meg for LC/CI/SI	129
Powerbook 140 & 170 4 meg	175
Powerbook 140 & 170 6 meg	259
Envisio Powerbook Display Adapter and memory	Call

CD - ROMS

NEC CDR-74 Gallery	879
NEC CDR-74	679
NEC CDR-37	496
Smart & Friendly w/Cable and Classic CD Collection	399
Super CD Collection	499

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Circle 55 on reader service card

128MB

"The Price/Performance Leader"

-DGR 128MB REM, MacUser Magazine, 3.5" Optical Hard Drive Review, July 1992

MacUser LABS Bottom Line Pick

DGR Technologies offers a new solution to hard disk storage with the 128REM Turbo™. This 3.5" 128MB optical drive boasts over a 50% increase in performance over current optical standards, with a seek time of less than one millisecond track to track, and sustainable transfer rate of 768 kbytes/second. In addition, the 128REM Turbo™ offers a new portability, storing 128 megabytes of removable, erasable optical storage on 3.5" disks in a compact external drive format. The small external dimension saves desk space in the office, and easily slides into a briefcase for convenient transport. Ensuring future compatibility, the 128REM Turbo™ conforms to both ANSI and ISO standards for the 3.5" magneto-optical format. All DGR Technologies magneto-optical drives come ready to use – complete with a cartridge, toll-free technical support, and the DGR Technologies one-year warranty and 30-day money-back guarantee. DGR Performance. DGR Reliability. DGR Technologies.

▶ DGR 128REM Turbo Portable
128MB Epson Mechanism 768Kb/s
34ms Access. 6ms Short Seek
$1299

▶ DGR 128REM
128MB MOST Mechanism 512Kb/s
42ms Access. 9ms Short Seek
$1199

▶ DGR 256REM
256MB MOST Mechanism 1.23Mb/s
35ms Access. 9ms Short Seek
$1699

128MB Cart **$59** 256MB Cart **$99**

FWB
FWB's Hard Disk ToolKit Personal Edition Included

One Year Warranty

30-Day Money Back Guarantee

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800-235-9748

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Circle 53 on reader service card

BW31

1-800-258-2650

FEATURING

SyQuest® REMOVABLE TECHNOLOGY

ClubMac 44mb	SQ555	Actual MAC Capacity: 42mb	$398
ClubMac 88mb	SQ5110	Actual MAC Capacity: 84mb	$498
ClubMac Dual 44mb			$749
ClubMac Dual 88mb			$919
ClubMac Dual 44mb & 88mb*			$889
Internal 44mb for Quadra 900 / 950			$388
Internal 88mb for Quadra 900 / 950			$488
44mb Cartridge	(10 pack-$62 each)		$64
88mb Cartridge	(10 pack-$96 each)		$99

SyQuest Drives include a TWO Year Warranty, one cartridge & necessary cables, SCSI Director™ v.2.7 Formatting Utility. * Includes (1) 44mb & (1) 88mb cartridge • SyQuest Cartridges carry a ONE Year Warranty.

NOW AVAILABLE SyQuest Drives for Quadra 900/950

New ELS Series

Quantum

Unformatted Capacity	Model	Description		Actual MAC Capacity	Internal	External
80mb	Go•Drive	2.5" Low Profile	17ms	80mb	$329	$429
120mb	Go•Drive	2.5" Low Profile	17ms	120mb	$459	$559
42mb	ELS42	3.5" Low Profile	19ms	40mb	$185	$245
85mb	ELS85	3.5" Low Profile	17ms	82mb	$269	$329
127mb	ELS127	3.5" Low Profile	17ms	124mb	$329	$389
170mb	ELS170	3.5" Low Profile	17ms	160mb	$385	$445
52mb	LPS50	3.5" Low Profile	11ms	49mb	$209	$269
105mb	LPS105	3.5" Low Profile	11ms	100mb	$319	$379
120mb	LPS120	3.5" Low Profile	10ms	116mb	$349	$409
240mb	LPS240	3.5" Low Profile	10ms	234mb	$589	$649
425mb	PRO425	3.5" Half Height	9ms	406mb	$899	$959

ELS drives have 32K cache, low power consumption, MTBF of 250,000 hrs and TWO Year Warranty. LPS drives have 64K - 256K cache, MTBF of 250,000 hrs, and TWO Year Warranty. PRO drives have 256K cache, MTBF of 150,000 hrs, and TWO Year Warranty. Go•Drives have 32K cache, low power consumption, MTBF of 150,000 hrs, and ONE Year Warranty.

Maxtor®

Unformatted Capacity	Model	Description		Actual MAC Capacity	Internal	External
120mb	7120XT	3.5" Low Profile	15ms	121mb	$329	$389
207mb	7213	3.5" Low Profile	15ms	202mb	$479	$539
330mb	LXT-340	3.5" Half Height	15ms	324mb	$679	$739
535mb	LXT-535	3.5" Low Profile	12ms	510mb	$1029	$1089
645mb	XT-8760S	5.25" Full Height	16.5ms	639mb	$1229	$1329
1.2GIG	PO-12S	5.25" Full Height	13ms	997mb	$1549	$1649
1.7GIG	PO-17S	5.25" Full Height	13ms	1433mb	$1779	$1879

Maxtor 3.5" Drives include a 1Year Warranty. Maxtor 5.25" Drives include a 2 Year Warranty.

ClubMac OPTICAL Drives

Model		Capacity	Description	Seek	External
CMO-OD3000	Teac	128mb	3.5" Half Ht	45ms	$1179
CMO-LF3004	Panasonic	128mb	3.5" Half Ht	45ms	$1169
CMO-3100E	Ricoh	128mb	3.5" Half Ht	45ms	$1249
CMO-3051E	Ricoh	594/652mb	5.25" Full Ht	28ms	$2695
CMO-5030E2	Ricoh	594/652mb	5.25" Full Ht	66.7ms	$2149
128mb Cartridge		3.5" Single Sided			$39
594/652mb Cartridge		5.25" - 512/1024 bytes/sec			$99

All ClubMac Opticals include ONE cartridge and ONE Year Warranty.

NEW!

MICROPOLIS

Capacity	Model	Description	Access Time	Internal	External
1.0GIG	2112	3.5" Half Ht./Fast SCSI-2	10ms	$1959	$2019
2.0GIG	1924	5.25" Full Ht./Fast SCSI-2	11.5ms	$3129	$3299

5 YEAR WARRANTY

FUJITSU

Unformatted Capacity	Model	Description		Actual MAC Capacity	Internal	External
425mb	M2623SA	3.5" Half Height	9ms	405mb	$969	$1029
520mb	M2624SA	3.5" Half Height	9ms	496mb	$1035	$1095
1.2GIG	M2266	5.25" Full Height	14.5ms	1029mb	$1589	$1689

Featuring ... the Elite Series

Seagate

Unformatted Capacity	Model	Description		Actual MAC Capacity	Internal	External
248mb	ST3283	3.5" Low Profile	12ms	235mb	$635	$695
1.2GIG	ST11200N	3.5" Half Height	10.5ms	1000mb	$1879	$1939
645mb	ST4767N	5.25" Full Ht W-R II	11.9ms	634mb	$1529	$1629
1.2GIG	ST41200N	5.25" Full Ht W-7	15ms	989mb	$1585	$1685
1.6GIG	ST41651N	5.25" Full Ht W-8	15ms	1350mb	$1989	$2089
2.1GIG	ST42100N	5.25" Full Ht W-9	12.9	1900mb	$2829	$2929
1.6GIG	ST41600N	5.25" Full Ht Elite-1	11.5ms	1307mb	$2269	$2369
2.4GIG	ST42400N	5.25" Full Ht Elite-2	11ms	2050mb	$3095	$3195
3.4GIG	ST43400N	5.25" Full Ht Elite-3	11ms	2750mb	$4329	$4429

Seagate Drives include a ONE Year Warranty.

5 YEAR WARRANTY

HEWLETT PACKARD

Unformatted Capacity	Model	Description		Actual MAC Capacity	Internal	External
234mb	C2233	3.5" Half Height	12.6ms	223mb	$749	$809
422mb	C2235	3.5" Half Height	12.6ms	402mb	$1159	$1219
1.2GIG	C2247	3.5" Half Height	12ms	1000mb	$2229	$2289
677mb	97556	5.25" Full Height	16.5ms	633mb	$1399	$1499

HP Disk Drives feature SCSI-2 embedded controller • MTBF of 150,000 hour

Call for Internal Prices

ClubMac TAPE BACKUP Systems

Capacity	Model	Description	Media	Access Time	External
155mb	Teac MT2ST/N50	Analog	CT600N5-7	MB/s	$489
600mb	Teac MT2ST/F50	Analog	CT600F 7-10	MB/s	$699
2.0GIG	ARDAT	DAT, DDS	4mm	10-15 MB/s	$1249
2.0GIG	WangDAT 1300XL	DAT, DDS	4mm	10-15 MB/s	$1329
3-5GIG	WangDAT 3200	DAT, DDS-DC	4mm	10-15 MB/s	$1549
2.0GIG	HP 35470A	DAT, DDS	4mm	10-15 MB/s	$1389
3-5GIG	HP 35480A	DAT, DDS-DC	4mm	10-15 MB/s	$1569
2.2GIG	Exabyte EXB-8200	Digital/Helical	8mm	10-15 MB/s	$1949
5.0GIG	Exabyte EXB-8500	Digital/Helical	8mm	10-15 MB/s	$2999

Includes RetroSpect v.1.3c Backup Software, One Tape and ONE Year Warranty

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NEW Lower Prices

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MONEY BACK 30 DAY GUARANTEE

PowerCache
(Classic, SE, LC, SE/30, II, IIx, IIcx, IIsi, IIci)

	w/o FPU	w/ FPU
16 MHz PowerCache	$399 *	$459 *
33 MHz PowerCache	$539 *	$659 *
40 MHz PowerCache	$749 *	$909 *
50 MHz PowerCache	$1079 *	$1319 *
Equalizer LC	$169	$239
PowerCache Adapter	$40	

* Cache Adapter not included

Cache Cards

FastCache IIsi	$279
FastCache IIsi with 68882	$349
FastCache IIci	$215
FastCache 040 (128K - Q700/900)	$259
FastCache 040 (128K - Q700/900/950)	$399

Expansion Boards for Mac LC & IIsi

DualPort IIsi	$165
PowerMath LC	$115
NEW! 33MHz Turbo 040	$Call

FREE CD-ROM OFFER

ASANTÉ Networking

MACCON+ 64K Thick/Thin or Thick/10BaseT	$159
MACCON 3 64K Thick/Thin/10BaseT (Most MACs)	$209
Friendly Net Adapter Thick or Thin or 10BaseT	$79
EN/SC10T SCSI Ethernet with 10BaseT	$249
EN/SC10TPB SCSI Ethernet with 10BaseT for PowerBooks	$309
EN/SC SCSI Ethernet w/ Thick,Thin,10BaseT	$349
EN/SCPB SCSI Ethernet w/ Thick,Thin,10BaseT for PowerBooks	$285
10THub - 12 port 10BaseT Hub / 8 port 10BaseT	$499 / $249
12 Port Smart Hub	$Call for Pricing and Options

Macintosh Memory

PowerBook 140/170

2MB Memory Module	$Call
4MB Memory Module	$Call
6MB Memory Module	$Call
PowerBook 160/180	$Call
Duo 210/230	$Call

Quadra 950

16mb Module	$Call
256 VRAM	$Call

Macintosh Memory

1mb X 8- 80ns	$Call
2mb x 8 - 80ns	$Call
4mb X 8 - 80ns	$Call
16mb X 8 - 80ns	$Call

Mac IIfx

1mb X 8 - 80ns	$Call
4mb X 8 - 80ns	$Call
16mb X 8 - 80ns	$Call

Video (Q700/900)

256K VRAM	$Call

NEW ITEMS!

Modems

PSI

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PowerModem (24/96/48 S/R fax modem)	$135
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TelePort Bronze/Silver/Gold	$199 / 349 / 435
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MICROTEK

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ScanMaker IIXE	$1185

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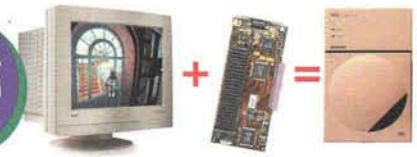

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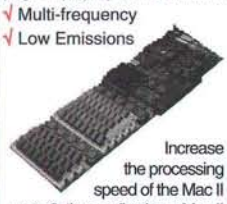

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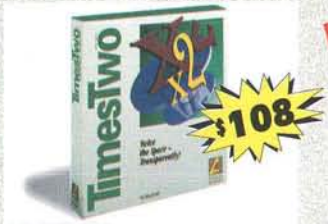

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127	349	419
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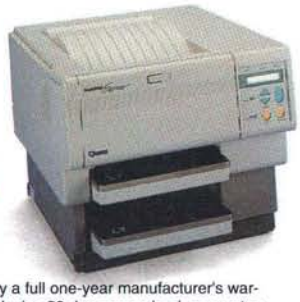

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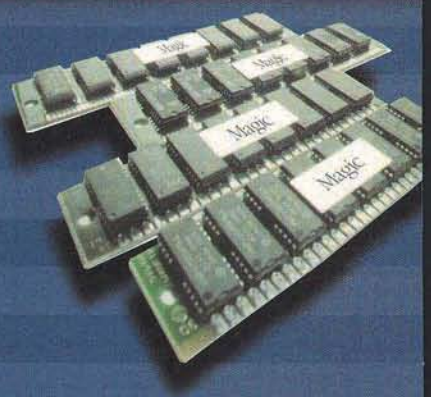

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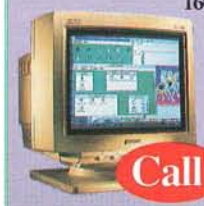

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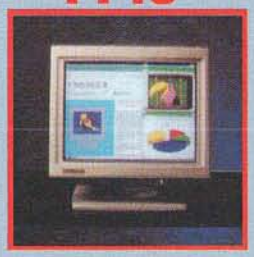

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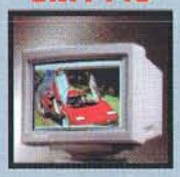

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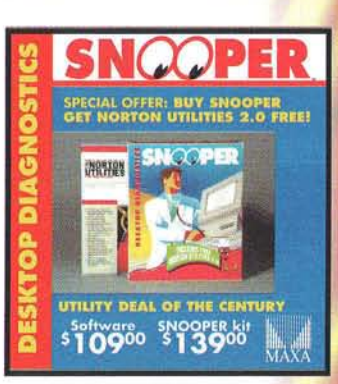

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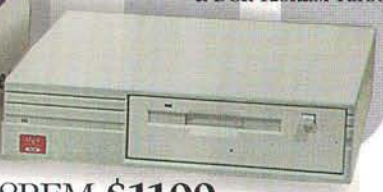

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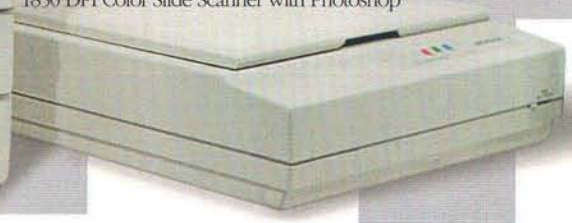

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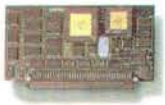

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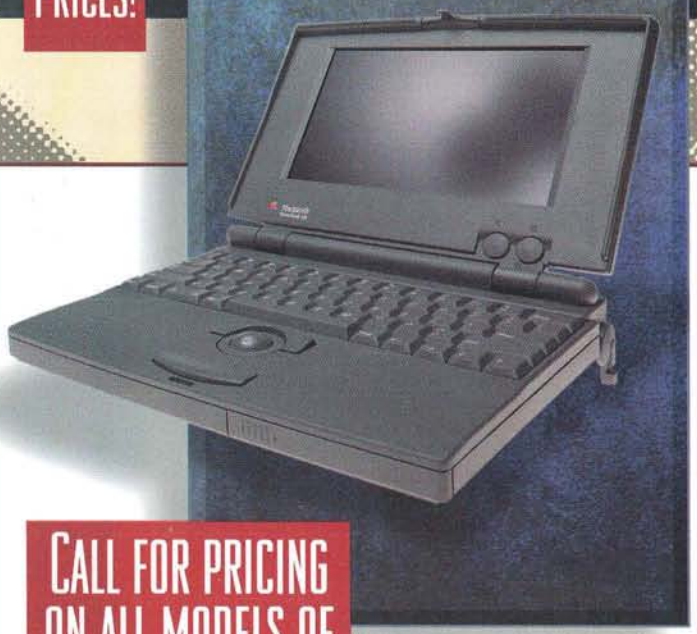

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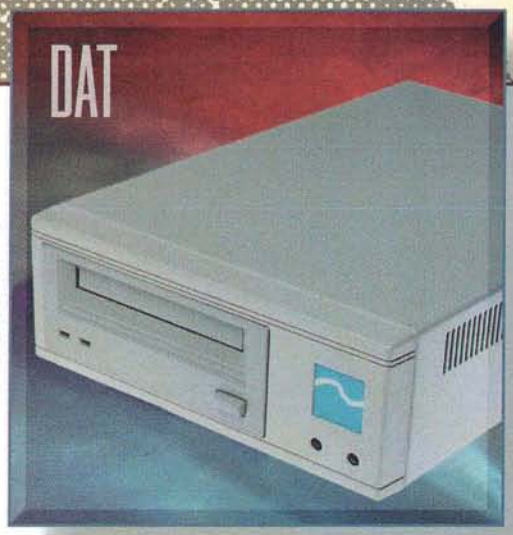

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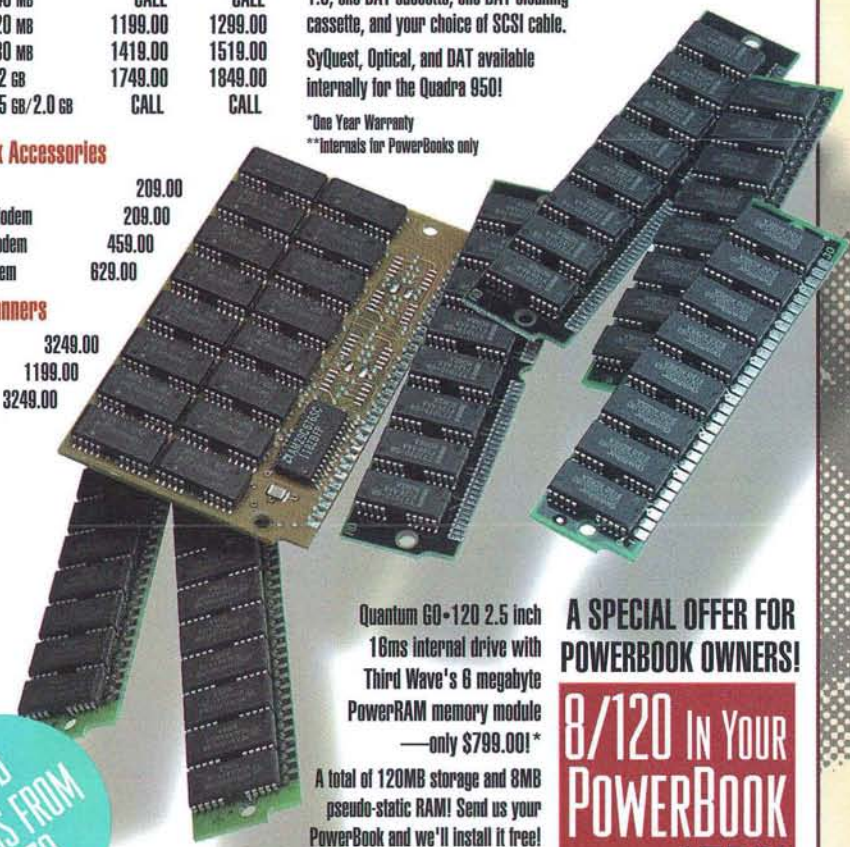

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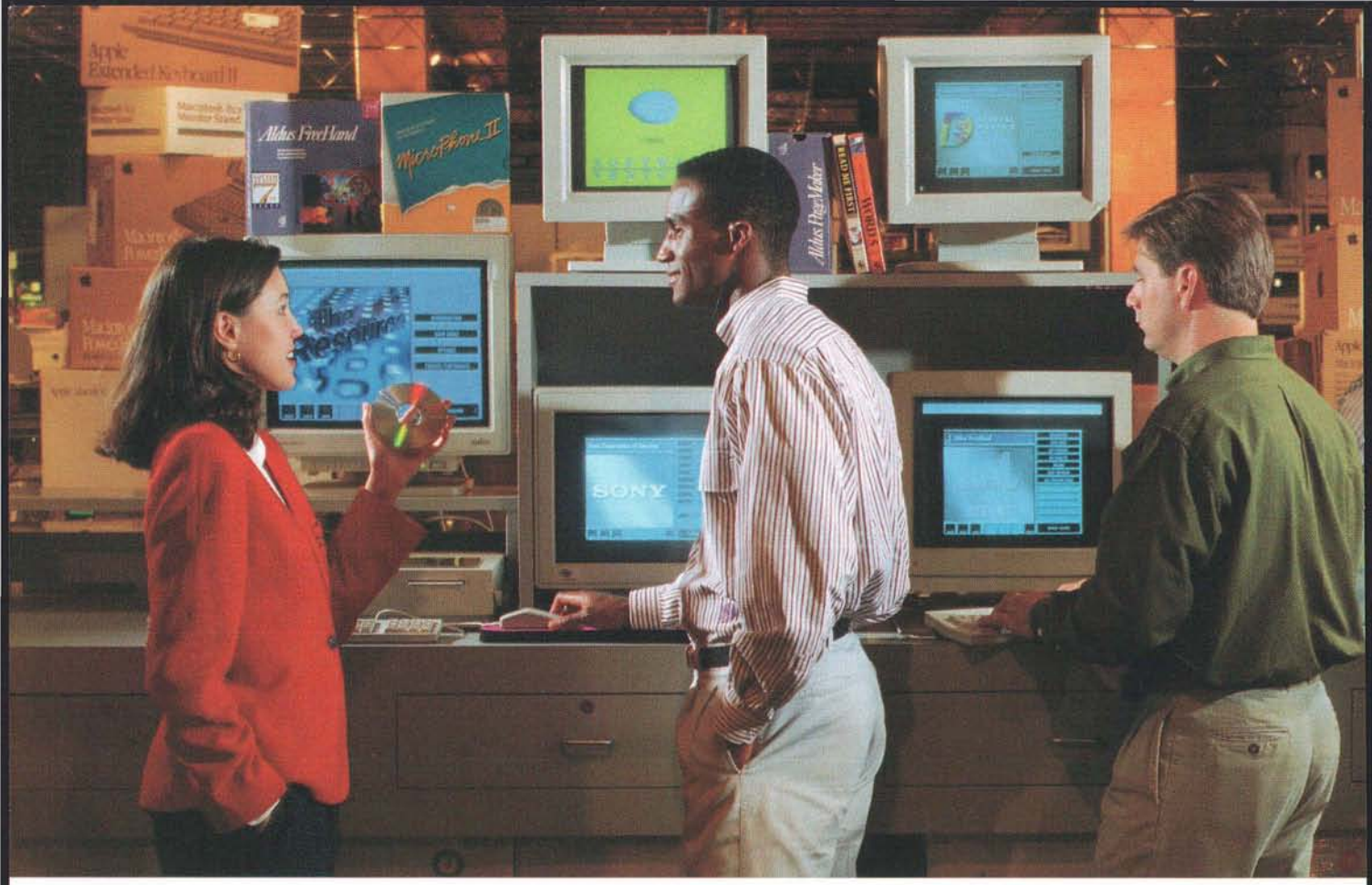

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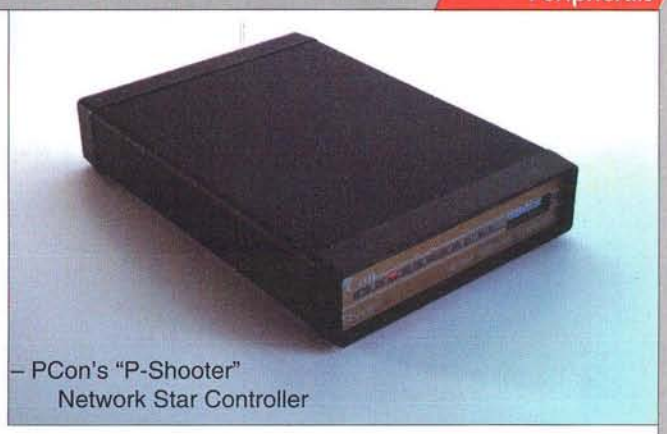

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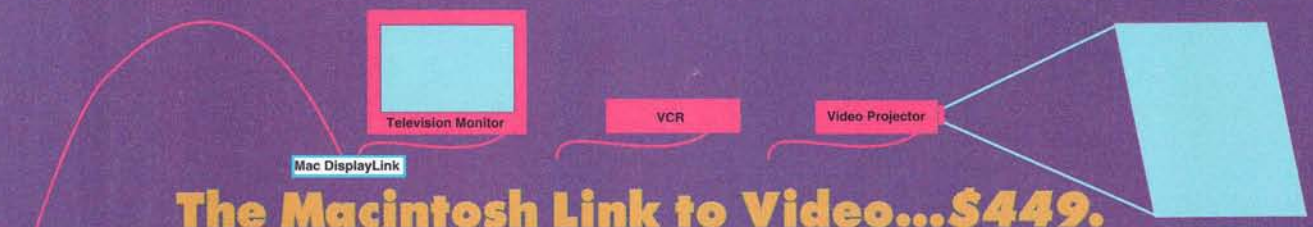

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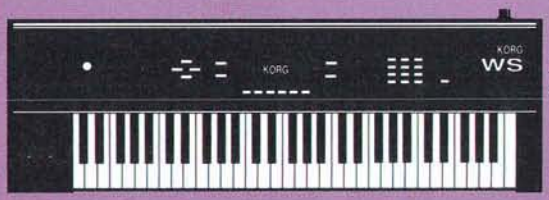

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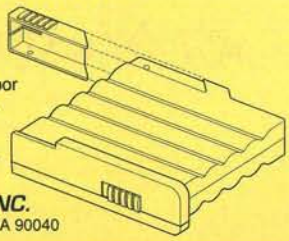

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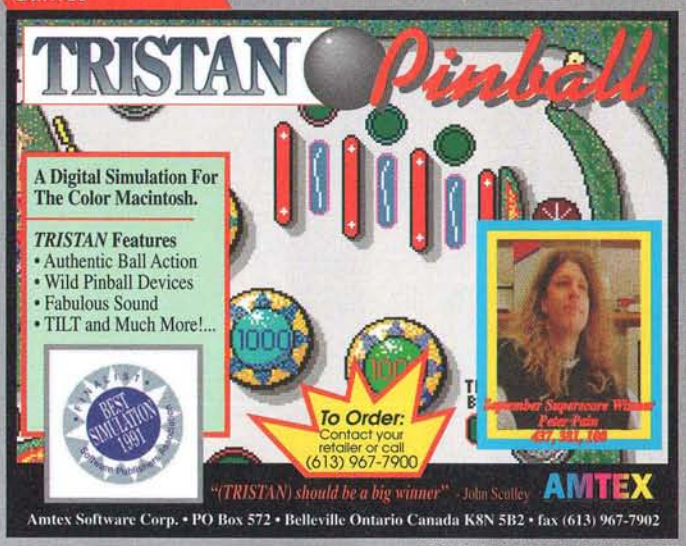

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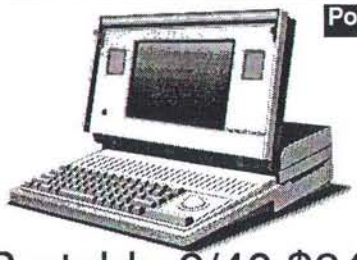

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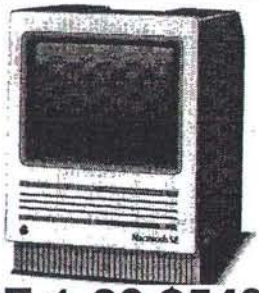

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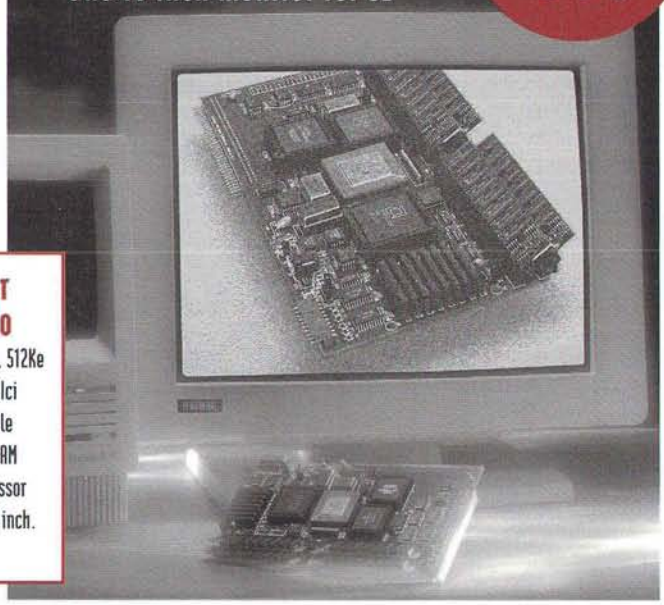

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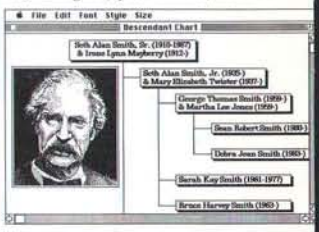

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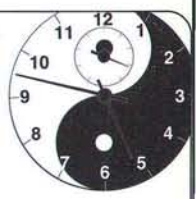

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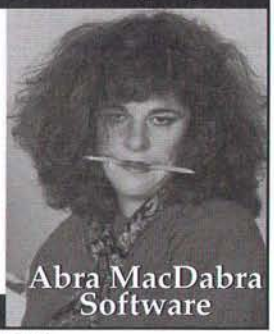

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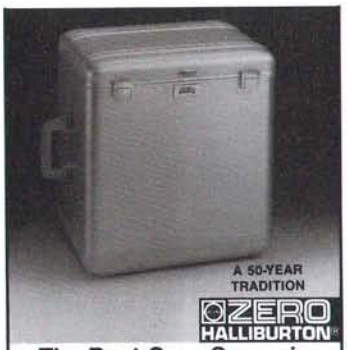

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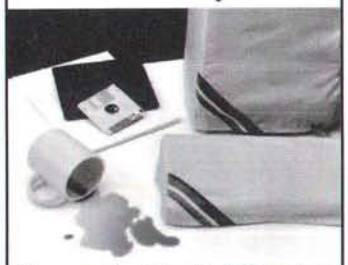

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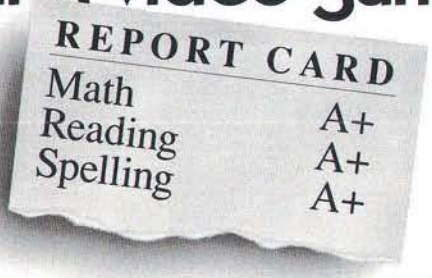

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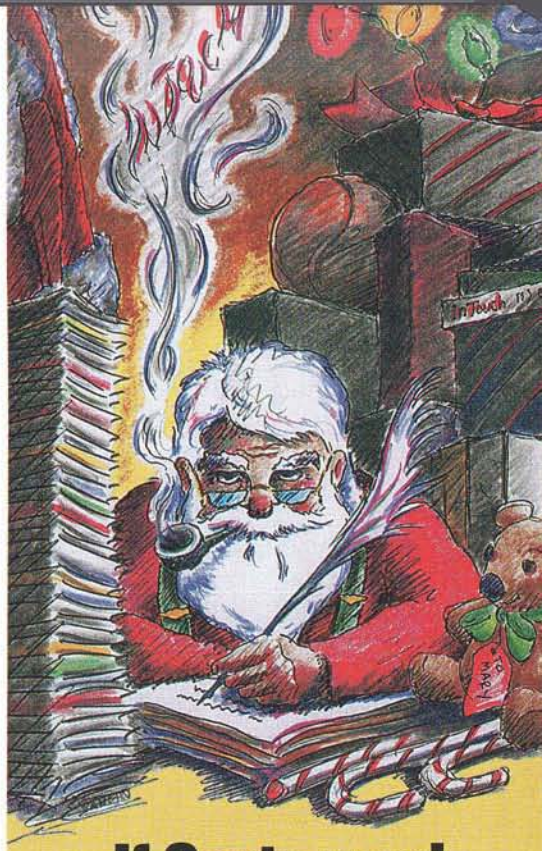

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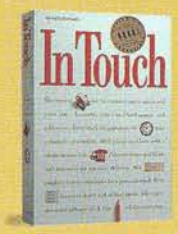

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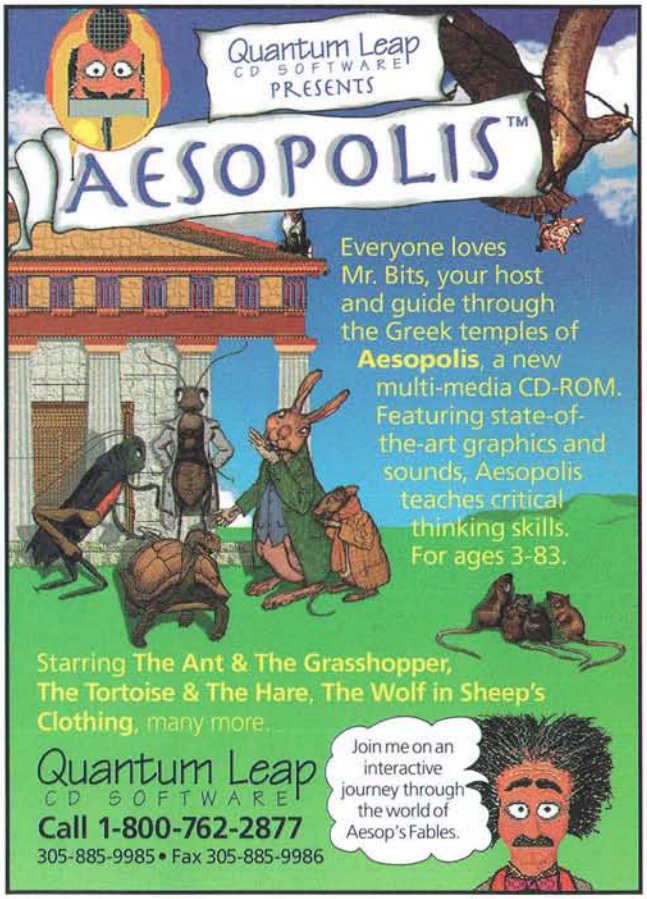

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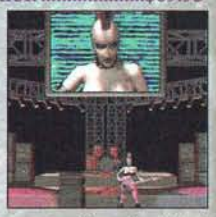

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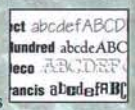

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13	5	5	**MacDraw Pro** *Claris Corporation*
67	11	6	**MacDraw II** *Claris Corporation*
44	8	7	**WordPerfect for the Macintosh** *WordPerfect Corporation*
68	12	8	**MacWrite II** *Claris Corporation*
30	7	9	**Quicken** *Intuit*
69	—	10	**Microsoft Works** *Microsoft Corporation*
6	6	11	**ClarisWorks** *Claris Corporation*
22	9	12	**MacProject** *Claris Corporation*
79	14	13	**Aldus PageMaker** *Aldus Corporation*
7	13	14	**1-2-3 for the Macintosh** *Lotus Development*
20	—	15	**Aldus FreeHand** *Aldus Corporation*

Education Software

Months on chart	Last month	This month	
45	1	1	**Where in the World Is Carmen Sandiego?** *Brøderbund Software*
26	3	2	**Where in Time Is Carmen Sandiego?** *Brøderbund Software*
16	5	3	**Math Rabbit** *The Learning Company*
58	—	4	**Reader Rabbit** *The Learning Company*
1	—	5	**The Writing Center** *The Learning Company*

Entertainment Software

Months on chart	Last month	This month	
57	1	1	**Microsoft Flight Simulator** *Microsoft Corporation*
32	—	2	**Falcon** *Spectrum HoloByte*
21	4	3	**Crystal Quest** *Casady & Greene*
33	—	4	**SimCity** *Maxis*
3	2	5	**Space Quest III** *Sierra On-Line*

Network/Data Communications

Months on chart	Last month	This month	
38	1	1	**PhoneNet** *Farallon Computing*
7	3	2	**AppleTalk Remote Access** *Apple Computer*
61	2	3	**AppleShare** *Apple Computer*
16	4	4	**Netware for Macintosh** *Novell*
23	—	5	**MacTerminal** *Apple Computer*

Add-In Boards

Months on chart	Last month	This month	
21	1	1	**Macintosh IIsi NuBus Adapter Card** *Apple Computer*
25	2	2	**Macintosh Display Card 8•24** *Apple Computer*
5	—	3	**Macintosh II FDHD Upgrade** *Apple Computer*
22	3	4	**Pivot** *Radius*
6	—	5	**Spectrum/8 Series** *SuperMac*

Utility Software

Months on chart	Last month	This month	
31	4	1	**SAM** *Symantec Corporation*
20	1	2	**After Dark** *Berkeley Systems*
10	2	3	**More After Dark** *Berkeley Systems*
26	3	4	**Norton Utilities for Macintosh** *Symantec Corporation*
21	5	5	**Virex** *Microcom*

The AmCoEx Index of Used Macintosh Prices

Machine/RAM/ Hard Drive	Average Sale Price	Monthly Change
Mac SE/2MB/20MB	$775	–$50
Mac Portable/1MB/40MB	$600	–$100
PowerBook 100/4MB/40MB	$750	–$50
PowerBook 140/4MB/40MB	$1400	–$150
Mac Classic/2MB/40MB	$700	–$75
Mac SE/30/2MB/40MB	$1700	$0
Mac LC/2MB/40MB	$850	–$50
Mac II/4MB/40MB	$1350	–$300
Mac IIsi/3MB/40MB	$1475	–$100
Mac IIcx/4MB/80MB	$1800	–$200
Mac IIci/4MB/80MB	$2300	–$50
Mac IIfx/4MB/80MB	$3000	–$300
Apple 12-inch B&W display/board	$200	$0
Apple 13-inch RGB display/board	$525	+$25
LaserWriter Plus	$950	$0
LaserWriter IINT	$1500	–$100

Index provided by the American Computer Exchange of Atlanta, Georgia (800/786-0717). It reflects sales during week of October 20. Configurations include keyboard and exclude monitor and display board for noncompact models.

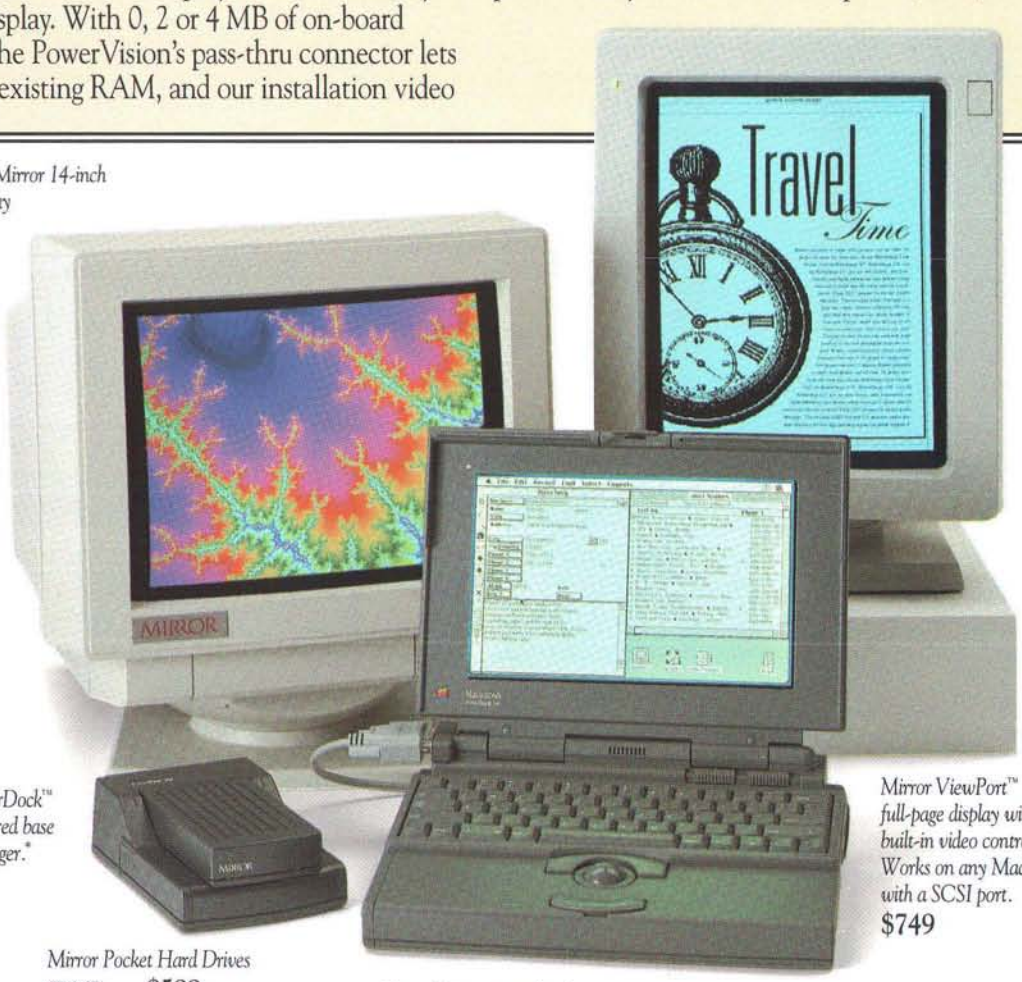
Source: Exclusive Audits & Surveys research from more than 250 Macintosh retailers and selected mail-order vendors. Covers sales during September 1992.

Mirror Introduces Desktop Performance For Your PowerBook...

With Mirror's exciting new peripherals, your PowerBook can function just like a desktop machine, with a high resolution monitor and plenty of storage.

The ***Mirror PowerVision***™, an internal video board for the PowerBook 140, 145, or 170, works with a variety of standard monitors, including our NEW 14-inch Color Display and 15-inch Gray-scale Display. With 0, 2 or 4 MB of on-board RAM, the PowerVision's pass-thru connector lets you use existing RAM, and our installation video makes setup a snap (professional installation also available).

The ***Mirror ViewPort***™ is a 15-inch monochrome display with a built-in SCSI video controller and QuickDraw acceleration for performance rivaling internal video boards. Ideal for PowerBooks, the ViewPort brings big screen power to any Mac with a SCSI port. *(continued)*



The NEW Mirror 14-inch Color Display
$399

Mirror PowerDock™ *battery powered base unit and charger.**
$199

Mirror ViewPort™ *full-page display with built-in video controller. Works on any Mac with a SCSI port.*
$749

Mirror Pocket Hard Drives
80 MB **$599**
120 MB **$699**
Includes SCSI cable for PowerBooks and standard Macs--a $100 value!

PowerVision internal video adapter board includes tools and a comprehensive installation video.
with 0MB **$499**†
with 4MB **$999**†

Systems including PowerVision board and display *from* **$898**†

*Uses your PowerBook battery and AC adapter. † Call for other options.

herals For The Desktop.

Drive and DAT Tape Drives, Mirror offers the capacities, speed, features and prices you want.

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For graphic design, illustration or pre-press, choose a Mirror color display. Available in 14-inch, 16-inch and 20-inch models, there's a Mirror color display that's right for every job.

The top-rated Mirror Color Scanner makes it easy to add sharp, vivid color images to your work at an unbeatable Mirror price; just $1199 including Adobe Photoshop.

If you need a printer, take a close look at the MirrorImage 309 Laser Printer and the MirrorImage 415 Tabloid Laser Printer. With Postscript Level 2, RISC processors, sophisticated paper handling and durable, high-speed printing engines, these printers work hard, so you don't have to.

All Mirror products are backed by our famous 30-day, "love it or return it" policy*, and the best customer support in the business. Call today to see for yourself.

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MirrorImage 415, Tabloid Laser Printer, features dual paper trays and a 15 pages-per-minute print engine. Leases available.
$2,999 ◀

19-inch Two-page Display w/ monochrome video card $799
21-inch Two-page Display $999†

MirrorImage 309, Postscript 2 laser printer
$1,699

15-inch Grayscale Portrait Display $399†
w/ monochrome video card $549

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Circle 125 on reader service card

...And Powerhouse Perip

The NEW Mirror 14-inch Color Display is the latest version of our best selling color monitor. Designed to work with the built-in video of your Mac LC, IIsi, IIci, or Quadra--or with Mirror's PowerVision video board for PowerBooks--this display features razor-sharp focus and brilliant color and it's still only $399!†

The ***Mirror Pocket Hard Drives*** and optional ***Mirror PowerDock*** redefine storage convenience. For moving data between machines, or to expand your PowerBook's capacity, these tiny drives fit anywhere. Slip the Pocket Drive into the PowerDock and use a standard PowerBook battery to power the drive while you travel. When you're back home, the PowerDock does double duty and charges your spare battery.

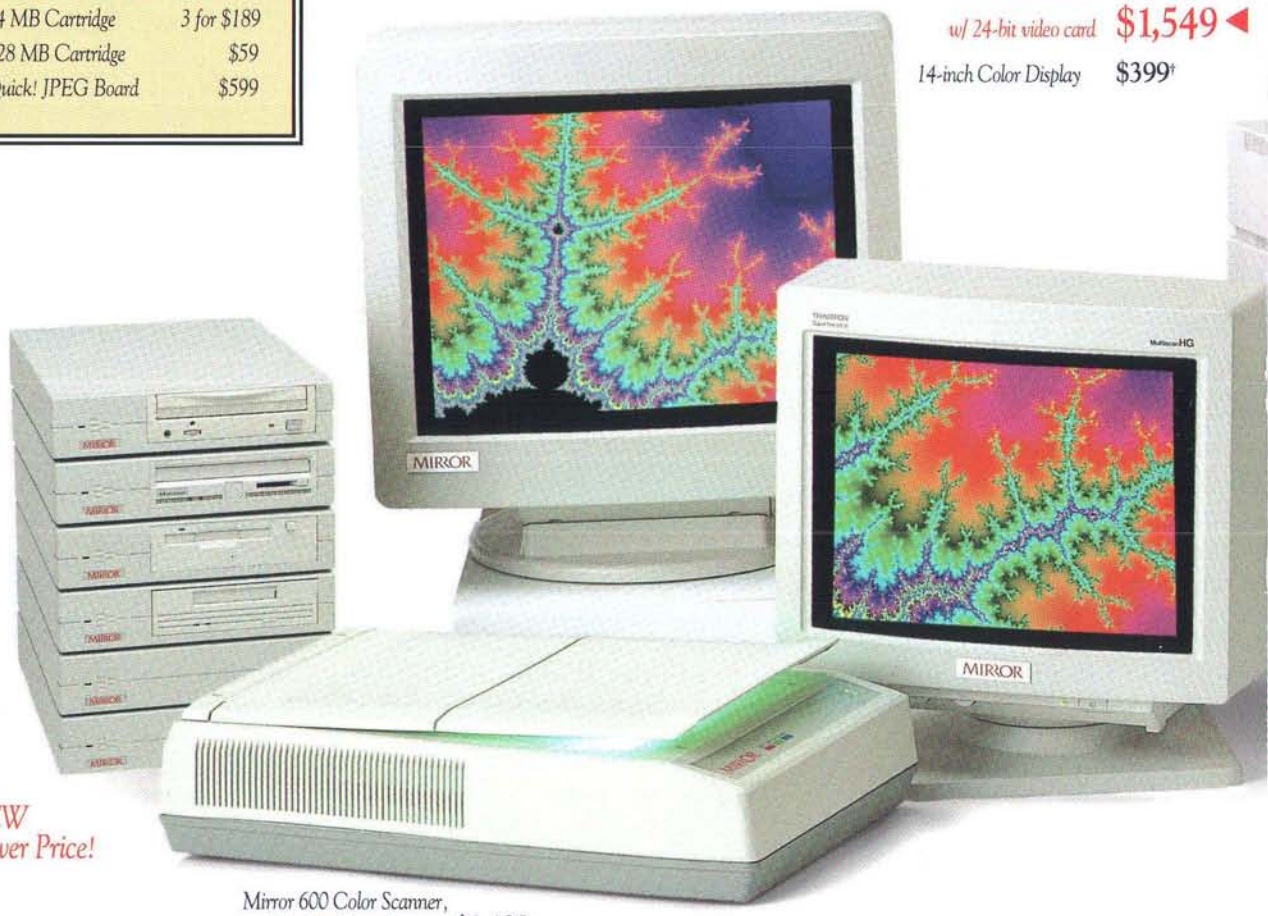
Whatever your need, whatever Macintosh model you use, Mirror has high performance peripherals to match.

Our complete line of storage systems can handle any task. From our critically acclaimed hard drives and CD-ROM, to our high performance 128 MB Optical

Drives	*Int.*	*Ext.*
85 MB (Q)	$349	$399
105 MB (Q)	$389	$439
127 MB (Q)	$409	$459
170 MB (Q)	$449	$499
240 MB (Q)	$649	$699
425 MB (Q)	$1,049	$1,099
595 MB	N/A	$1,499
1 GB	N/A	$1,999
128 MB Optical Drive		$1,299
44 MB SyQuest Drive		$429
88 MB SyQuest Drive		$549
DAT Tape Drive		$1,399
CD-ROM Drive		$599
Now PHOTO CD compatible!		
44 MB Cartridge		3 for $189
128 MB Cartridge		$59
Quick! JPEG Board		$599

20-inch ProView Trinitron Display, 8-bit **$2,499**
w/ 24-bit video card **$2,699**
20-inch ProView V Color Display, 8-bit **$1,799**
w/ 24-bit video card **$1,999**

16-inch Trinitron Display **$1,099†**
w/ 8-bit video card **$1,349** ◀
w/ 16-bit video card **$1,449** ◀
w/ 24-bit video card **$1,549** ◀
14-inch Color Display **$399†**



◀ *NEW Lower Price!*

Mirror 600 Color Scanner, with Adobe Photoshop **$1,199**

*You pay shipping costs (and consumables for printers). †For built-in video. Prices are F.O.B. origin. Prices are for U.S. orders only; call for international pricing. All prices subject to change.

File

It won't hop.

Edit

It won't skip.

Chooser

But wait till you see it jump.

While the cursor may hop or skip with some trackballs, Turbo Mouse® has always been known for its ultrasmooth movement.

Now, the latest version of Turbo Mouse is known for something else—jumping. Our new Brilliant Cursor technology makes it possible.

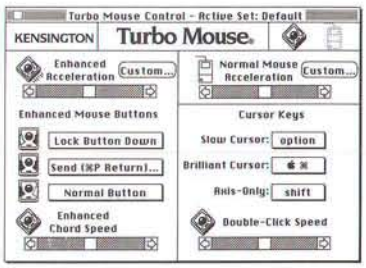
With it, you can move the cursor instantly to predefined HotSpots on the screen, such as the File and Edit menus and the Trash icon.

First, you define your HotSpots. Then, click a button and move the ball in the direction you want to go. The cursor automatically jumps to the predefined HotSpot. You can even program in different HotSpots for different applications and for different users.

And Brilliant Cursor technology is not all that's new with Turbo Mouse 4.0. Also new is advanced acceleration with three levels of control and Enhanced Mouse Buttons that let you execute one of seven programmable commands. For example, send a Print command with just one click using Send String. Or move the cursor with ultra precision using Slow Cursor. Even save different combinations of commands for each of your favorite programs.

Introducing Turbo Mouse 4.0

With the all new Brilliant Cursor™ technology, you can actually make the cursor jump to any spot on the screen.



Then there's the award winning Turbo Mouse hardware. Hardware that has won more awards than any other input device. Hardware that has consistently been voted "Best Input Device" by Macintosh users worldwide. Features include a large comfortable ball, "easy-click" buttons, long-lasting precision stainless steel bearings, and two ADB ports for chaining other devices.

Turbo Mouse 4.0 is fully System 7.0 compatible. To receive information by fax, call 800-535-4242, dial 82 and request document 320. For general information, call 800-535-4242. Outside the US, 415-572-2700.

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